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SWM SUSTAINABLE WILDLIFE MANAGEMENT PROGRAMME

Towards sustainable wildlife management

An in-depth study for the promotion of community conservancies in Zambia and Zimbabwe

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Towards sustainable wildlife management

An in-depth study for the promotion of community conservancies in Zambia and Zimbabwe

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Executive summary

Zambia and Zimbabwe, with Angola, Botswana and Namibia, constitute the Kavango-Zambezi Transfrontier Conservation Area (KaZa-TFCA), which is the largest transfrontier conservation area (TFCA) in the world (520 000 km²), and whose key objective is to join fragmented wildlife habitats to form an interconnected mosaic of protected areas and transboundary wildlife corridors. In this region, wildlife populations have declined over the past three decades, mainly due to poaching and loss of habitat. Other causes can also be blamed, like recurring droughts and climate change, which exacerbate the vulnerability of local communities and reduce their livelihood by affecting the yield of their crops and livestock.

Conceptual model of Community Conservancy: In this TFCA, the Sustainable Wildlife Management (SWM) Programme aims to address these challenges by promoting the model of Community Conservancy (CC) to diversify income generating activities and supply a well-balanced source of wild and domestic protein. In Zimbabwe, the SWM Programme in KaZa supports the emerging project of Mucheni CC encompassing three wards of Binga District, in Matabeleland North Province. In Zambia, the target implementation sites are the Simalaha and Inyasemu CCs, located in southern Zambia (see Chapter II).

A landscape approach: CC is a concept where wildlife resources are managed together with other land resources through proper and integrated land-use planning. The concept strives to minimize conflicts and promote harmony between the different land use types with the ultimate objective of improving livelihoods through sustainable natural resources (NR) management. To achieve this, four specific objectives expressed by the Theory of change model have been defined (**see Chapter III**): (1) improving income generation, through sustainable fisheries and hunting; (2) improving the coexistence of humans with wildlife, by reducing the costs to protect field crops and livestock; (3) contributing to global and environmental conservation, by promoting the conservation of protected and endangered species; and (4) contributing to the implementation of a number of regional and international treaties (e.g. CITES, Lusaka Agreement, the SADC Protocol on wildlife).

Recognition and respect of communities' rights to their resources: The aim of CC is to promote natural resources utilization, including wildlife, as an economic and sustainable land use option – operating on the basic philosophy of returning the management of wildlife and other resources to the local inhabitants. However, it is also about empowering rural communities to coexist with wildlife and develop local skills and institutions to manage wildlife (**see Chapter II**). To achieve this, consultations were conducted with administrative/political authorities at national or local levels, traditional leaders and the communities that depend on the natural resources. All programme activities follow a community rights-based approach (CRBA), in the framework of relevant human rights, and use an adapted model of Free, Prior and Informed Consent (FPIC) for safeguarding local communities' rights (**see Chapter III**).

Assessing the enabling conditions for the emergence of CCs. In relation to the power of communities over natural resources, including fauna and flora, the challenge is to legally strengthen the role they could play in their own management. There is no legal position which

recognizes the establishment of CCs in both countries. In Zambia, the local communities can legally develop management plans for community development, like in Simalaha where a Community Development Facility (CDF) was recently established leading to a Community Conservancy Trust. In Zimbabwe, there is no legal instrument for the communities to participate in the SWM Programme in KaZa, and the commonly used model to constitute a CC is registration of the community as a trust or an association. An in-depth analysis of the history of the countries and the legal texts that govern their laws was done to legally assess the fishing and hunting sectors in both Zambia and Zimbabwe, which considers gaps, inconsistencies and other obstacles within and between applicable policies, the institutional framework, sectoral laws and regulations and customary laws and practices in these countries (**see Chapter IV**). This analysis ended up with the production of legal country profiles (LCP), which present the double interest of helping the government to better envisage possible amendments of the acts governing parks and wildlife, and of providing the SWM Programme team in KaZa with arguments for the legal recognition of the community conservancy.

Understanding each CC's environment and resources contained: Data collected during surveys and consultations with key stakeholders were useful for the SWM Programme team in KaZa to understand how the management of wild species resilient to hunting or fishing (WSRHF) could be improved. The observation is that wildlife populations in the three CCs are generally low, and that fish are of great importance, although sustainable fishing practices are rarely followed and result in reduced quantities and sizes of the fish (**see Chapter VI**). This report looks into the future of hunting in the face of challenges like competition for habitat resources and the harsh realities of managing wildlife both as an enterprise and as a source of food for rural communities, among others. To enhance alternative livelihoods and incomes, studies were pursued on the wildlife enterprises, and an assessment of current and potential consumptive/non-consumptive nature-based enterprises was conducted (**see Chapter V**). Although the landscape has vast potential to develop nature-based enterprises, very few such enterprises are on the ground and operational. The development of robust management plans, effective wildlife monitoring protocols, and alternative sources of protein are some of the important pathways that the SWM Programme in KaZa is pursuing, and these are essential for the strengthening of wildlife conservation and empowerment of rural communities.

Exploring opportunities of alternative sources of food and income: Among these alternative sources of proteins, special interest was given to livestock issues and fish aquaculture and processing. Livestock is central to the livelihoods of the inhabitants, known as agro-pastoralists, a mix of crops with livestock rearing. Livestock production is central to their culturally rich traditions for economic purposes, draught power, manure and transport, but also for ceremonies and rituals. The production systems mainly based on cattle, goats and poultry are unfortunately basic (low input/low output), and there is need for holistic improvement (genetic, food, habitat and health) and linkages with the market (**see Chapter VII**). These are the two main topics of the SWM Programme team in KaZa in the following steps of the Programme. In terms of fish aquaculture and processing, the major work was on training on seasonal fish ponds (especially in Zambia) and on the promotion of improved processing equipment adapted to the socioeconomic context characterized by high poverty levels, small-scale production and lack of professional organization.

Recognizing roles and limitations of natural resources in coping strategies: The development of these alternative sources of proteins contributes to the improvement of the local vulnerable

economy. The human food consumption patterns from results of studies on meat consumption and the establishment of food diaries show that wild meat consumption is low, even if it plays a key role in supporting the coping strategies of the highly food-insecure population (**see Chapter VIII**). The Programme recommends considering the diversity of the species consumed (mainly birds and rodents, but also insects, which are not treated in this report) in the attempt to enforce the ban on wild meat consumption. It also focuses on the low purchasing power and on the weakness of local market structures, which make it difficult to increase local food consumption through improving meat or fish availability.

Anticipating ways of changing antagonistic behaviour towards wildlife: Interactions among people, livestock and wildlife increase with the increase in human activities, enhancing conflicts and risk of disease transmission. A special chapter presents the current state of these interactions at implementation sites of the SWM Programme in KaZa, which will help offset the costs of coexistence with wildlife in the conservancies (**see Chapter IX**). Local strategies to mitigate human–wildlife conflicts were studied, based on the local community's indigenous knowledge and skills in reducing conflicts. To improve health risk management, an innovative surveillance system combining genomic diagnosis with innovative real-time digital disease detection is proposed. At the level of the conservancies, the implementation of a combined community-based surveillance system for human–wildlife conflicts and disease outbreaks, based on the use of mobile phones, was suggested and will be put to test during the rest of the Programme.

Empowering communities as an appropriate level of organization to manage wildlife: The last chapter (**see Chapter X**) presents general conclusions and recommendations of the midterm SWM Programme in KaZa. It presents the main lessons learned during the Programme's diagnostic stage and then proposes and justifies adjustments to the strategy for the remaining two and a half years of implementation. It reiterates the two ultimate goals of the SWM Programme in KaZa and promotes a self-adaptive management by communities in a holistic and timely manner. Based on the main conclusions of the nine previous chapters, it proposes minor modifications to the initial theory of change, which respects the main principles while insisting on some aspects, which were not clearly distinguished. This amended theory of change does not negate the fact that it can still be applied equally to both countries, in respect of the principles of the SWM Programme in KaZa which considers the three conservancies as part of a single SWM Programme site.

Acronyms and abbreviations

AA	appropriate authority
ACEIDHA	Africa Centre of Excellence for Infectious Diseases of Humans and Animals
ADMADE	administrative management design
AEZ	agroecological zone
AGRITEX	Agricultural, Technical and Extension Services
ALERT	African and Environmental Research Trust
BEMC	Binga Environmental Management Committee
BHT	Bio-Hub Trust
BLS	baseline survey
BRDC	Binga Rural District Council
BRDDC	Binga Rural District Development Committee
BTB	bovine tuberculosis
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBNRM	Community-Based Natural Resources Management
CBO	community-based organization
CC	community conservancy
CDF	Community Development Facility
Chete SA	Chete Safari Area
Chizarira NP	Chizarira National Park
CIFOR	Centre for International Forestry Research
CIRAD	French Agricultural Research Centre for International Development
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPP	Community Partnership Park
CRB	Community Resources Board
CRBA	community rights-based approach
DC	District Council in Zambia
DLVS	Department of Livestock and Veterinary Services
DMP	data management plan
DNPW	Department of National Parks and Wildlife
DoF	Department of Fisheries
EMA	Environmental Management Act
EMA	Environmental Management Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FGD	focus group discussion
Fisheries MC	fisheries management committees
FMD	foot-and-mouth disease
Forest MC	forest management committees

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FPIC	Free, Prior and Informed Consent
FTA	Flinders Technology Associates
GMA	game management area
GPS	Global Positioning System
HAT	Human Animal Trypanosomiasis
HH	Household
HIMS	hydrological information management system
HRH	His Royal Highness
HWC	human–wildlife conflict
HWC-P	HWC platform
ICC	Inyasemu Community Conservancy
IIED	International Institute for Environment and Development
ISALS	Internal Savings and Lending Scheme
IUCN	International Union for Conservation of Nature and Natural Resources
K	Kwacha (10 Kwacha = USD 1)
KaZa	Kavango-Zambezi Transfrontier Conservation Area
KBE	Kafue Basin Ecosystem
KII	key informant interview
KMS	knowledge management system
KMU	KaZa Management Unit
LCP	legal country profile
LRM	local resource management
LUP	land-use planning
MCC	Mucheni Community Conservancy
MECTHI	Ministry of Environment, Climate, Tourism and Hospitality Industry
MFL	Ministry of Fisheries and Livestock
MLGRUD	Ministry of Local Government, Rural and Urban Development
MOMS	Management Oriented Monitoring System
MoU	Memorandum of Understanding
MPs	Members of the National Assembly
MTA	Material Transfer Agreement
MTENR	Ministry of Tourism, Environment and Natural Resources
NCS	National Conservation Strategy
ND	Newcastle disease
NEAP	National Environmental Action Plan
NGO	non-governmental organization
NLC	national legal consultant
NP	national park
NPE	National Policy on Environment
NR	natural resource
NRM	natural resource monitor
NTFP	non-timber forest products

PA	protected prea
PAC	problem animal control
PAH	polycyclic aromatic hydrocarbons
PPF	Peace Parks Foundation
PPPA	public private partnership agreement
RAs	result areas
RDC	Rural District Council in Zimbabwe
RP-PCP	Research Platform – Production and Conservation in Partnership
SA	safari area
SADC	Southern African Development Community
SCC	Simalaha Community Conservancy
SMART	Spatial Monitoring and Reporting Tool
SMU	Sustainable Management Unit
SO	safari operator
SRC	Site Review Committee
SWM	Sustainable Wildlife Management
TADs	transboundary animal diseases
TBD	tick-borne diseases
TFCA	transfrontier conservation area
UAV	unmanned aerial vehicle
UN	United Nations
UNZA	University of Zambia
USAID	United States Agency for International Development
VAG	Village Action Group
VEMC	Village Environmental Management Committees
VFMC	Village Fisheries Management Committee
WARDCO	Ward Development Committee
WCS	Wildlife Conservation Society
WDA	wildlife dispersal area
WEMC	Ward Environmental Management Committee
WFP	World Food Programme
WLHI	wildlife–livestock–human interface
WSRHF	wild species resilient to hunting or fishing
WVZ	World Vision Zambia
WWF	World Wide Fund for Nature
ZELA	Zimbabwe Environmental Law Association
ZIEM	Zambia Institute of Environmental Management
ZPWMA	Zimbabwe Parks and Wildlife Management Authority

GLOSSARY

Animal-based food (animal-source food): animal products from domestic and wild species used for human consumption including meat, fish and any other non-flesh.

Bushmeat: meat from wild African animals as food (according to the Oxford English Dictionary). In the SWM Programme, the term "wild meat" as defined below is used.

Community: social group whose members live together, or have common goods or interests.

Community conservancy: legally-recognized and geographically-defined areas that have been formed by communities who have united to manage and benefit from wildlife and other natural resources.

Domestic meat: meat and by-products (e.g. offal, fats) issuing from farmed domestic animal species (livestock and poultry), used for human consumption.

Wild meat: meat and by-products (e.g. offal) from wild animal species used for human consumption. This includes all non-domesticated mammals, birds, reptiles and amphibians hunted or harvested for food. This definition does not include freshwater and marine fish, insects, crustaceans, worms and molluscs (when included, considered "wild animal-based food").

Domestic animal-based food: food issuing from domestic species used for human consumption, including meat, by-products, fish and by-products, and non-flesh food (such as eggs and milk).

Wild animal-based food: food issuing from wild species used for human consumption, including meat by-products, fish and non-flesh food issuing from captured wild insects (honey included), crustaceans, worms, molluscs and eggs from all wild species.

Hunting (and/or fishing) territory: a geographical area with delimited contours within which an individual or group of individuals exercises or may exercise an exclusive right to hunt (and/or fish), and within which identical management measures are applied for the species hunted and/or fished.

Indigenous People: descendants of those who inhabited a country or geographical area at the time when population groups of different cultures or ethnic origins arrived there and subsequently became dominant, through conquest, occupation, colonization or other means.

Intervention site: see "Territorial Management Unit"

Sustainable Management Unit (SMU): In the sense of the SWM Programme, synonymous with "hunting (or fishing) territory" in which the user community promotes legal and sustainable village hunting practices.

Territorial Management Unit (TMU): set of SMUs within which similar management measures are applied with regard to hunting (and/or fishing) and the trade of its products. The spatial contours of a TMU may be jurisdictional (e.g. department, province, wildlife reserve, logging concession, etc.) or functional (e.g. all the SMUs supplying an urban consumption centre). In the context of the SWM Programme, synonymous with "site of intervention" or a subset of it.

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I. GENERAL INTRODUCTION

Patrice Grimaud

A. General context of the report

Millions of people depend on wild meat for food and livelihoods. Wild meat is an important source of protein, fat and micronutrients, particularly for Indigenous Peoples local communities in tropical and subtropical regions of Africa, Asia and Latin America. However, the demand for wild meat has continued to increase, especially in urban areas. If hunting to meet this demand is not reduced to a sustainable level, populations of targeted species will decline and food insecurity will increase in rural communities. Recent studies show that this hunting is excessive and already threatens hundreds of species with extinction.

In this context, the Sustainable Wildlife Management (SWM) Programme was initiated in 2017 with the aim of improving the conservation and sustainable use of wildlife in forest, savannah and wetland ecosystems. Specifically, the SWM Programme promotes wildlife management that empowers resident communities considered to have traditional rights in terms of access and use of wildlife resources and recognizes customary practices that can help ensure that these communities can continue to use these resources for their livelihoods in the long term, without depleting them.

To achieve this, the SWM Programme implements projects in 15 countries in Africa, the Caribbean and the Pacific. Based on a community rights-based approach and the implementation of a Free, Prior and Informed Consent (FPIC) protocol, the Programme works with all stakeholders at the national level and at pilot field sites to create the conditions for sustainable community-based wildlife management, including:

- a collective understanding of and adherence to the principles of sustainability within rights-holding communities;
- the legal existence and/or proper application of participatory management regimes and hunting rules adapted to social, economic and ecological contexts;
- appropriate technical solutions and support to build community capacity for the adaptive management of wild meat offtake;
- appropriate support to limit the impact of other threats to wildlife, including hunting by non-rights holders and hunting for the supply of unsustainable urban wild meat chains; and
- measures to compensate communities and the other stakeholders of the wild meat value chains for reduced income and protein supply that may result from reduced sustainable hunting and urban demand for wild meat.

In the selected countries, eight different models of sustainable community-based wildlife management, adapted to the jurisdictional context of the pilot field sites, are being developed in an integrated landscape management approach.

This report is produced at the midterm of the implementation of the SWM Programme country projects. For further information: www.swm-programme.info

B. The SWM Programme in KaZa

B.1 Background and challenges

The Kavango-Zambezi Transfrontier Conservation Area (KaZa-TFCA) area is a biodiversity-rich functioning ecosystem under the management of the Angolan, Botswanan, Namibian, Zambian and Zimbabwean governments and local communities.

The communities are largely rural and at the centre of communities' livelihoods are activities such as extensive agricultural production and natural resources exploitation (fishing, hunting). Erratic rainfall and frequent droughts make agriculture (including livestock) a risky undertaking. Although human activities are largely agriculture-based, KaZa also boasts a large population of wildlife with close to 371 394 km^2 under some form of wildlife management, leaving 148 520 km^2 for agricultural use including rangelands. This biologically rich area experiences large-scale annual migrations of megafauna. Communities living in rural areas in KaZa use wildlife both for food and as a source of income. The relationship between people and wildlife has been dominated by frequent cases of human–wildlife conflicts (HWC), but lately these have been somehow addressed by mitigation measures carried out by various actors. More importantly, it has been the flow of benefits from wildlife projects to the local communities which has been the huge catalyst for change. The SWM Programme implemented in Zambia and Zimbabwe, under KaZa, has the model: "Community Conservancy (CC) is the basis for a nested wild and domestic protein supply model promoted for protein and income". It aims to reduce the pressure of wildlife hunting by promoting, under the auspices of CC, sustainable use of wildlife and alternative sources of protein from livestock, forest foods and fish (including aquaculture).

B.2 Components of the SWM Programme in KaZa

The SWM Programme in KaZa aims to achieve the same six result areas (RAs) developed for the SWM Programme as a whole.

Results Objective 1

"The institutional and legal framework for the sustainable use of meat from wild species resilient to hunting or fishing is improved" by analysing in both countries the law through a legal matrix and identifying the gaps and impediments to the promotion of a CC model.

Results Objective 2

"Management of wild species resilient to hunting or fishing (WSRHF) is improved", by the implementation of innovative models for the sustainable uses of WSRHF and the safeguarding of protected and endangered species, while promoting innovative approaches addressing HWC.

Results Objective 3

"Supply of alternative protein is improved", by creating a favourable environment for the development and a better management of sustainable livestock, forest foods and aquaculture sectors as alternative sources of protein and income, with a particular focus on small-scale animal husbandry.

Results Objective 4

"Consumption of wild meat becomes sustainable", by matching the consumption of wild meat with the sustainable production capacity of WSRHF, and compensating it by livestock farming, forestry and aquaculture products.

Results Objective 5

"Monitoring, Evaluation and Learning" by: (i) coordinating the development of programme-level and site-level theory of change; and (ii) identifying a set of transversal programme indicators and monitoring methods in collaboration with R areas.

Results Objective 6

"Knowledge is generated to support the development and adoption of public policies that reconcile conservation issues and food and nutrition security" by: (i) designing and implementing a knowledge management system (KMS) to use the information and knowledge generated by the SWM Programme; and (ii) assisting the Site team to design and implement site-level information systems.

The implementation of all activities contributing to the achievement of these six outcomes follows a community rights-based approach (CRBA), in the framework of relevant human rights, and uses an adapted model of Free, Prior and Informed Consent (FPIC) for safeguarding local communities' rights.

B.3. Institutional framework

The Programme is a joint initiative of several institutions and organizations, including the Food and Agriculture Organization of the United Nations (FAO), the Centre for International Forestry Research (CIFOR), Wildlife Conservation Society (WCS) and the French Agricultural Research Centre for International Development (CIRAD). It is funded and supported by the European Union (EU). Programme management in KaZa is being carried out by CIRAD, the Executing Agency, which regularly presents all the decisions taken for implementation of Programme activities, as well as its main results, to the Site Review Committee (SRC) constituted as follows: the Minister responsible for the national wildlife agencies (Department of National Parks and Wildlife – DNPW in Zambia, Zimbabwe Parks and Wildlife Management Authority – ZPWMA in Zimbabwe), chair of the Committee alternatively; the site coordinator; the FAO focal points for the Programme in Zambia and Zimbabwe; the focal points of the EU Delegations for the Programme in Zambia and Zimbabwe; and a representative of the KaZa Secretariat.

All activities are coordinated and directed by the KaZa Management Unit (KMU), under the leadership of the site coordinator. A regional coordinator ensures good coordination and communication among the different project stakeholders. Implementation partners include local communities (and their community-based organizations) in Simalaha Community Conservancy (SCC, Zambia), Inyasemu Community Conservancy (ICC, Zambia) and Mucheni Community Conservancy (MCC, Zimbabwe).

B.4. Duration and amount

The SWM Programme in KaZa has a planned duration of five years, which started in July 2018, following the inception phase. The total amount committed to the SWM Programme in KaZa is ca USD 5 500 000.

B.5. Monitoring, evaluation and learning, and communication

The SWM Programme in KaZa monitoring, evaluation and learning system is based on a theory of change co-constructed with the different beneficiaries: it is on this basis that the programme has defined the monitoring indicators as well as the assumptions underlying the pathways towards impacts. In addition to monitoring the implementation of the programme, the purpose of this system is to evaluate the impacts of the programme and the paths that led to them. The local knowledge management system (KMS) of the site involves implementing and running an information system encompassing the meat food system of the CCs. The knowledge generated continuously by the programme is centralized and synthesized into a central and local database management system.

B.6. Rationale for the SWM Programme intervention

The SWM Programme in KaZa aims at contributing to the local, economic and social development of Zambia and Zimbabwe by promoting a sustainable use of natural resources, including wildlife and fisheries, through the establishment of CCs, and consequently improving the coexistence of humans with wildlife by reducing the costs of protecting their livestock and field crops. The SWM Programme in KaZa contributes to global environmental conservation by promoting, through the CCs, the conservation of protected and endangered species, and to the implementation of a number of regional and international treaties (e.g. Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES, Lusaka Agreement, Bonn convention).

The SWM Programme in KaZa is innovative in that it quantifies the trade in wildlife and analyses its socioeconomic dimension, as well as promoting alternative sources of proteins (in particular non-timber forest products – NTFPs, livestock, aquaculture) to reduce the pressure on wildlife. The SWM Programme in KaZa is also demonstrative and replicable as it mainly focuses on wildlife, an essential component of all KaZa-TFCA landscapes, and it largely involves the local communities. The economic and financial sustainability of the SWM Programme in KaZa relies on the promotion of diversified and significant wildlife-based economic activities, such as hunting, tourism, food production and marketing. By aiming at a better management of populations of wild species and their habitats, the SWM Programme in KaZa is designed to contribute towards the sustainable exploitation, both economic and ecological, of wildlife by local communities. Civil society organizations have to be involved before the end of the programme.

The ecological and environmental feasibility is ensured through the production of CC management plans, the integration of various actors and capacity building for these actors. The communities are largely involved in the SWM Programme in KaZa, through their engagement with the implementation of an FPIC process. The coordination of the SWM Programme in KaZa ensures throughout its duration the involvement of the different stakeholders already involved or present in the programme sites in KaZa as well as the coherence of the actions implemented in a partnership-based manner.

B.7. Risks and supporting measures

Several risks, the likelihood of which varies between low and high, have been identified during the inception phase. At this time, the COVID-19 pandemic did not yet exist and, since its emergence, the difficulties of travelling in the field and between countries have made the implementation of the SWM Programme in KaZa more difficult. The risk with a high occurrence probability is Elite capture of CCs causing local communities not to benefit. This risk would have a medium impact on SWM Programme in KaZa implementation. The risks with a medium probability of occurrence are: political landscape deteriorates; relevant legislation or regulations are not implemented, creating unsustainable use of wildlife; poaching of wildlife is high. These three risks are judged as having a medium impact on the SWM Programme in KaZa. Finally, the risks with a low likelihood are: the tenure for securing CCs is weak; the SWM Programme in KaZa approval and the release of funds are delayed; Zambia's and Zimbabwe's macroeconomic conditions deteriorate; wildlife sources are exhausted; wildlife markets and protein value chains are poor; national disasters and contestation of the land identified for the CC occur. The first of these risks would have a low impact, the next four would have a medium impact, and the final one would have a high impact.

C. Context and objectives of the report

Following the principles that led to the choice of sites in both Zambia and Zimbabwe (see **Chapter II**), the social, economic and ecological environment of the programme's intervention areas was the subject of a series of numerous studies and field surveys in the first years of the programme's implementation. Together with the wildlife regulatory aspects in force in the two countries, these studies made it possible to draw up an in-depth diagnosis, which is essential to the objective of the SWM Programme in KaZa. This report synthesizes and analyses all the knowledge acquired and available at the end of year 2020 at the field site, based on the baseline surveys already carried out.

Who are the target groups? The actors involved in the SWM Programme in KaZa implementation and monitoring are the first ones concerned: donors, programme management units (PMUs), at institutional and local levels, and evaluators in particular. Among these targets, the role of government focal points is major, as they are the vectors of national policy and governance decisions. Finally, at the level of each site, traditional leaders and their representatives, as well as the programme's partners in the field, can gain information and knowledge in order to have a precise vision of the activities implemented in the SWM Programme in KaZa and the objectives pursued.

This report is divided into ten chapters. After a general introduction (this Chapter I), Chapters II to IX are largely based on original data acquired during the Programme. Chapters II and III present the SWM Programme in KaZa and the intervention site, respectively. **Chapter II** develops the national historical and political contexts and the governance and wildlife management model proposed by the programme, and presents the programme's approach in favour of local beneficiaries. It also exhibits the theory of change and the main working assumptions formulated at the beginning of the project.

Chapter III is mainly oriented towards describing the geographical, biophysical and human environments of the intervention site. **Chapter IV** consists of a legal assessment of the hunting

sector in both Zambia and Zimbabwe. This analysis considers gaps, inconsistencies and other obstacles within and between applicable policies, the institutional framework, sectoral laws and regulations and customary laws and practices in these countries.

Chapters V to IX concentrate on the results obtained since the beginning of the SWM Programme in KaZa and are displayed in three main parts: (i) methodology; (ii) results; and (iii) a final section summarizing the lessons learned and making recommendations for the continuation of the programme. **Chapters V, VI and VII** present the main sectors of hunting, fishing and livestock farming respectively, in their ecological and socioeconomic dimensions (state of the resource, harvesting levels, economic dependence on the resource, governance, etc.). **Chapter VIII** (Consumption patterns of meat and fish products) looks at the practices and standards that shape the consumption of meat products in general and wild meat in particular in both Zambia and Zimbabwe. **Chapter IX** (human–wildlife interactions, HWC) deals with the interactions between man and wildlife with a focus on the characterization of HWC and the health risks associated with hunting practices.

Chapter X presents the conclusions and recommendations at the midterm of the SWM Programme in KaZa, based on both the recommendations of the preceding chapters and on final discussions with the authors of the diagnostic studies, the local programme team and members of the SWM Programme management team. It leads to an adjustment of the initial theory of change, and presents some modifications linked to the observations of the last two years, and to the opportunities and challenges that these two years of existence have put forward for the benefit of the SWM Programme in KaZa.

The list of the species found in the CCs of the SWM Programme in KaZa and mentioned in the report is given in the **Appendix** section.

This synthesis was produced under the direct responsibility of the site coordinator, with the technical support of the staff, consultants and administrations involved in the SWM Programme in KaZa, the inter-R group and the Results teams. The Result 6 coordinator and his team ensured the overall coordination of the synthesis in collaboration with the Results coordinators and the Communication team. The contributors to each chapter are listed at the beginning of each.

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II. PRESENTATION OF THE SWM PROGRAMME IN KAZA

Davison Gumbo, Maxwell Phiri, Penias Banda and Patrice Grimaud

Introduction

The community conservancy (CC) as well as its central tenets and applications under the Sustainable Wildlife Management (SWM) Programme are presented in this chapter. We present the key results of the application of this model in specific chapters in this report. The programme team presents the governance issues surrounding Sustainable Management Units (SMU) which constitute some of the core aspects of the connectivity of wildlife areas within the Kavango-Zambezi Transfrontier Conservation Area (KaZa-TFCA) and how community conservancies add to their value. The development of robust management plans, effective wildlife monitoring protocols, and alternative sources of protein are some of the important pathways for the strengthening of wildlife conservation and empowerment of rural communities. The management of each CC must address these governance issues if the concept of the CC is to be realized.

Materials and methods

This chapter is based on the results of multiple interviews to determine the different actors involved in the SWM Programme in KaZa and their weight, whether these actors are administrative/political authorities at national or local levels, or traditional leaders and the communities that depend on the natural resources. These interviews made it possible to analyse governance in relation to wildlife conservation and to draw up an analysis of the stakeholders for each of the community conservancies.

In addition to these interviews, several workshops were held in order to analyse with all these stakeholders a theory of change that will have to be iterative and adaptive to changing situations throughout the project, as well as the social safeguard tools that are essential for the communities to make informed decisions about the SWM Programme in KaZa.

A. National historical and political context

The Republics of Zambia and Zimbabwe were British colonies and as such share some commonalities in terms of legal statutes and experiences. Pathways to independence varied greatly, with Zimbabwe variously known as Southern Rhodesia (1911–64), Rhodesia (1964–79), or Zimbabwe Rhodesia (1979–80), while Zambia, as a colony, was named Northern Rhodesia (1911–64) but gained independence in 1964 as the Republic of Zambia. Both were also at one time under the British South Africa Company, and were part of the ill-fated Federation of Rhodesia and Nyasaland (1953–63). The two countries are landlocked and share a 200 km common boundary stretching to the north. In addition, Zimbabwe shares boundaries with the Republic of South Africa, Botswana and Mozambique, while Zambia borders Angola, Botswana, Democratic Republic of the Congo, Malawi, Mozambique, Namibia, United Republic of Tanzania and Zimbabwe.

A.1. Zimbabwe

Zimbabwe achieved majority rule and independence in April 1980 following a long period of colonial rule, which began in 1890, as well as a 15-year period of white-dominated minority rule from 1965. The 2013 Constitution defines Zimbabwe as a unitary, democratic and sovereign Republic. It is a multiparty democratic political system with an electoral system based on universal adult suffrage and equality of votes. Political and electoral rights are enshrined in Section 4 of the Constitution, which recognizes political rights as fundamental human rights, as well as in the Electoral Act [Chapter 2:13]. The executive authority of Zimbabwe vests in the President who exercises it, subject to the Constitution, through the Cabinet. The President is the Head of State and Government and the Commander-in-Chief of the Defence Forces. Section 90 of the Constitution sets the President's duties which include upholding, defending, obeying and respecting the Constitution as the supreme law of the nation and ensuring that it and all the other laws are faithfully observed. Further, the President must: promote unity and peace in the nation for the benefit and well-being of all the people of Zimbabwe; ensure the protection of the fundamental human rights and freedoms and the rule of law; and respect the diversity of the people and communities of Zimbabwe. The President discharges his functions with the assistance of two Vice Presidents who perform any other functions, including the administration of any Ministry, Department or Act of Parliament, that the President may assign to them. The Constitution vests legislative authority in the legislature which consists of the Senate and the National Assembly. Judicial authority is vested in the Ministry of Justice, Legal and Parliamentary Affairs with the Constitutional Court being the superior court of record.

A.2. Zambia

Zambia was formerly known as Northern Rhodesia. The drive for independence was started by tribal chiefs, arguing against the federation (Rhodesia and Nyasaland) when they pressed the Northern Provincial Council to address the people's concerns over land matters and inequality. They were joined by clerks and teachers who sat in the African Representative Council, who called for the formation of an expressly indigenous political body to organize political action against the white settlers. This led to the creation of the Northern Rhodesia Congress in 1948 and, as opposition grew, students, mineworkers and other black Africans were encouraged to boycott and picket European businesses as well as not to cooperate with the Federal government. With more repression, a greater desire for an independent Zambia grew until a new constitution was drawn up in 1964, and elections the same year allowed for universal suffrage after 20 years of active engagement.

In 1991, the country experienced a peaceful political transition from a one-party to a multiparty system of government. Zambia has never experienced civil war arising from political differences or transition. Nonetheless, state managers have not been able to fully capitalize on the massive popular support of the Zambian people to consolidate democracy and a culture of respect for human rights. The fifth (2006–2010) and the seventh (2016–2021) national development plans were viewed as prerequisites to the advancement of the rule of law, poverty reduction and sustainable development. However, the government's efforts to fulfil this need are seriously deficient in this respect. According to the 1991 constitution of the country, the President should ensure that the country's laws are fully observed, but, while the constitution has been amended five times since 1996 (the latest being in 2016), the major provisions have remained intact and

unchanged. The President holds the welfare of the people at the centre of discharging his/her rule and therefore fundamental human rights and freedoms and must uphold the rule of law. To carry out these key functions, the President works with a Vice President and Ministers (sector-based) who perform designated functions provided through the various acts of Parliament. There is a National Assembly as well as a house of chiefs that are also at the core of managing the affairs of the state.

B. Wildlife governance and management model

B.1. Description of the governance and management model

Wildlife policies in KaZa member countries (Namibia, Angola, Zambia, Botswana and Zimbabwe) have been heavily influenced by the 1999 Southern African Development Community (SADC) Protocol on Wildlife Conservation and Law Enforcement, which has over time acted as the guiding policy document. In addition, the KaZa-TFCA Treaty of 2011 provides for a governance structure for the KaZa-TFCA including the National Committees, which coordinate the implementation of country-specific conservation programmes, ensuring alignment between national and KaZa-TFCA-wide activities. The committees facilitate the participation of national stakeholders in the wider planning processes and ensure that local communities derive benefits from the KaZa-TFCA. The Secretariat which coordinates the day-to-day operations of the KaZa-TFCA is of additional interest. It facilitates workshops, programme implementation and interlinking programmes, and ensures effective communication within the KaZa countries.

Over the decades, Zambia and Zimbabwe are known to have positively promoted the role of communities in the sustainable management of wildlife and other natural resources through the concepts of Community-Based Natural Resource Management (CBNRM), and Communal Areas Management Programme for Indigenous Resources (CAMPFIRE), respectively. These two models offer the sustainable utilization of wildlife and other natural resources as a livelihood option for rural communities – especially the ones living in wildlife areas which are hot and arid regions too marginal for agriculture, such as Kazungula in Zambia and Binga in Zimbabwe.

In Zambia, the concept of CBNRM was first promulgated in policy instruments such as the National Conservation Strategy (NCS) of 1985. The CC model is underpinned by a willingness of communities, their leaderships and partners including government to manage wildlife and other natural resources under each community's jurisdiction. The communities are expected to obtain direct financial benefits from activities associated with consumptive and non-consumptive tourism. In the two countries where the CCs are located, i.e. Zambia and Zimbabwe, arrangements and procedures for communities to gain from wildlife and other resources in protected areas (PAs) have been in place since the late 1900s, but there have been no exclusive community-run amalgamated land units of this nature. Experiences have driven communities and their leaders, e.g. chiefs and local area councillors, to think of deploying the CC model in these two countries. In Zambia the key leaders have been traditional chiefs while in Zimbabwe it was a combination of chiefs and local ward councillors.

The establishment of a CC is a stepwise process starting with a common cause with respect to the management and sharing of benefits from locally available natural resources. The vision is often

tagged to national experiences imported into an area by community members and expounded and suggested for adoption by the community by leaders such as chiefs, ward councillors and village heads. This often triggers early dialogue at the community level with some additional messages coming from local non-governmental organizations (NGOs) and government extension agents, all combining to focus on the development of a vision of the future of land and use with respect to wildlife and other natural resources. Critical questions that are often raised centre on land availability, type of animals, vegetation, people and how the interactions among and between the various entities involved had been addressed in the past. Views of the community members are captured at the local level especially on cohabitation with wildlife. From similar initiatives established in the region, it is possible to formulate the following principles which in turn guided the establishment of governance systems for the CCs and are described in Box II.1.

Box II.1: The 7 guiding principles of CC establishment

- a legally registered entity with clearly defined boundaries and a constituted management body run by the community for the development of residents and the sustainable use of wildlife and tourism.
- an entity managed by a group elected to serve the interests of all its members
- an place where residents can add income from natural resources management (wildlife, tourism) and from traditional farming activities
- a place where wildlife populations increase as they are managed for productive gain
- a place where the value of the natural resources increases, enhancing the value of the land
- an entity through which services and developments can be channelled and integrated
- a land zoned for multiple uses to minimize conflict and maximize the interests of all stakeholders.

In these principles, the centrality of a living functional unit running the CC is called for rather than implied. Around such an entity are people, resources and a capacity to deal with localized contractions and conflicts. The application of the principles is often supported by biophysical and social data and information generated about the CC by the communities with support from partners so that monitoring systems can be put in place to show change and progress. Thus, the process of setting up a CC must be inclusive and encompass all the interested parties, and the management unit must address all interests as much as possible. This is informed by the long-established CCs in Namibia, which programme staff and Zimbabwean stakeholders had the opportunity to visit.

B.2. Selection of intervention sites

B.2.1. Selection criteria

The selection of the sites of the SWM Programme in KaZa was the subject of identification work in Zambia and Zimbabwe that lasted several months before the official start of the programme, and was carried out by a joint working group of conservation experts, national and regional decision-makers and representatives of the SWM Programme in KaZa. Their duty was aimed at promoting a multipurpose wildlife and fish uses and trade (consumptive and non-consumptive) project offering alternative livelihood options for rural communities living in marginal areas rich in wildlife, in: (i)

diversifying local sources of income; (ii) improving food access of vulnerable rural communities from wildlife utilization (direct and indirect benefits); (iii) diversifying livelihood; and (iv) improving resilience to climatic and socioeconomic shocks. This working group was previously made aware of the objectives of the SWM Programme in KaZa, summarized as reducing the social and economic impacts of sharing space and resources with wildlife and minimizing human–wildlife conflicts to reach a sustainability based on three pillars, economic, social and ecological. A set of preselected indicators was proposed for each of these pillars in order to benefit a sufficient number of households in an equitable way without socially reprehensible practice, and to create additional value without permanently exhausting natural resources.

After considering the data and information, and conscious that the CC model was legally non-existent in the two countries at the conceptual stage, the expert group decided to select Simalaha and Mucheni as the potential sites, in Zambia and Zimbabwe respectively. In Zambia,

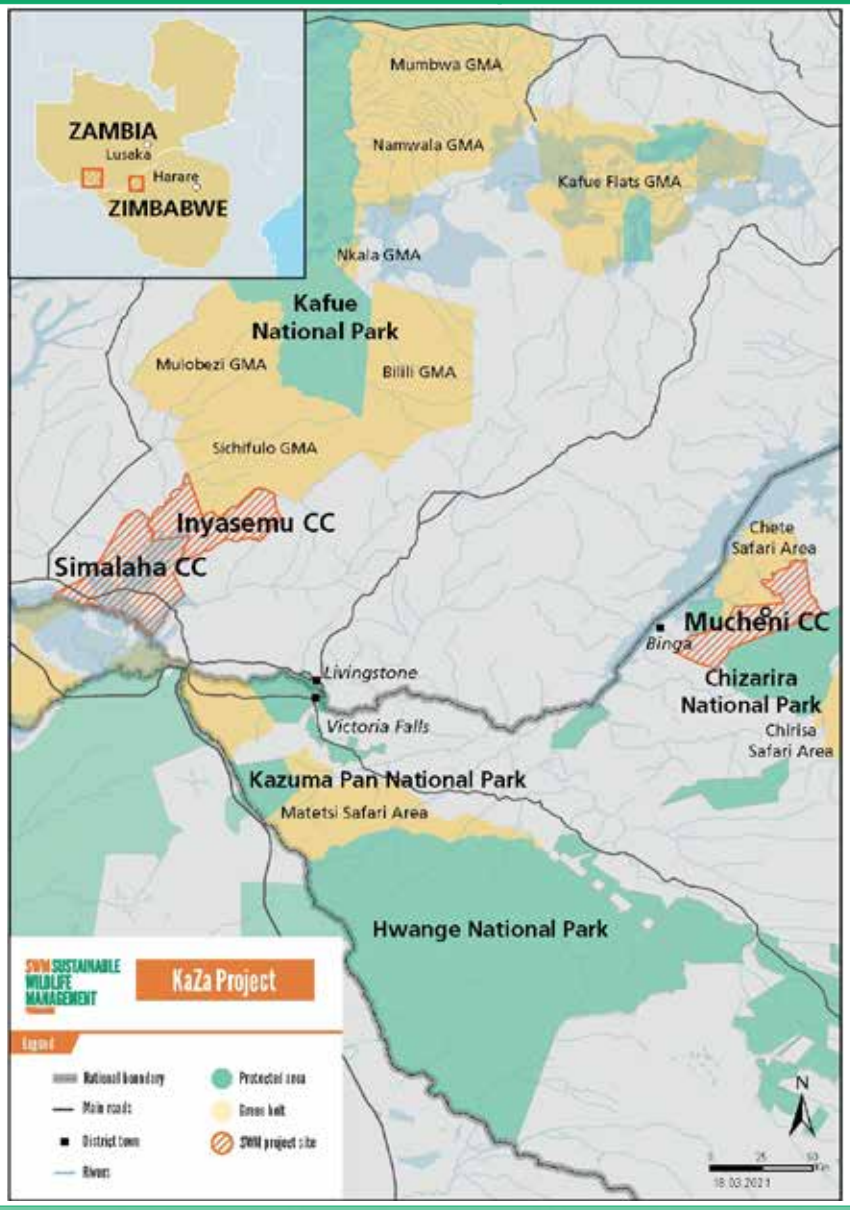


Figure II.1: Location map of the three CCs of the SWM Programme in KaZa (*Source:* SWM Programme in KaZa)

from the beginning and in line with KaZa-TFCA's idea of linking up wildlife dispersal areas (WDAs), adding Inyasemu to the conservancy was also considered, as this would link Kafue National Park and Chobe in Botswana (Figure II.1). The SWM Programme in KaZa was officially launched after adoption of the project document produced during this inception phase, whose title is "Model: Community Conservancy as a basis for a nested wild and domestic protein supply model promoted for protein and income".

These conservancies are at various levels in their development but are all strongly influenced by the CBNRM approach – a concept widely used in southern Africa. The region has a long history of rural communities jointly with the government managing and benefiting from natural resources under their jurisdiction. The planned conservancies are not at variance with current attempts at state-led efforts to conserve, manage and protect natural resources, but complement such efforts by providing an alternative which involves a greater role for local communities and their leaderships.

B.2.2. Specific aspects in the CCs of the SWM Programme in KaZa

B.2.2.1. In Zimbabwe

Mucheni Conservancy was originally established as a 7 000 ha contiguous area in Ward 4 of Binga District in Chief Sinansengwe's area. The conservancy was established through the collaborative effort of the Ward 4 councillor and the chief in 2016 and following a feasibility assessment done by the Zimbabwe Parks and Wildlife Management Authority (ZPWMA), which recommended the area as being suitable for a conservancy. Binga Rural District Council (BRDC) facilitated the demarcation of the initial 7 000 ha, which was then named Mucheni Community Conservancy (MCC). The MCC is currently run along CAMPFIRE lines with the Ward Environmental Management Committee (WEMC) being the local institution responsible for local administration of the MCC with technical support from local resource monitors. BRDC has appropriate authority (AA) for the area and conducts anti-poaching and problem animal control (PAC) through a team of rangers under the CAMPFIRE Department. The MCC has a wildlife quota and is under lease to Tokoloshe Safaris for consumptive safaris. The safari operator (SO) carries out activities such as road maintenance, game water supply and anti-poaching patrols in the leased area. The establishment of conservancies is provided for in the Rural District Council (RDC) policy and is considered as a viable and strategic option for resource management in areas suitable for this type of activity in the district. This fitted well within the SWM Programme's thrust and especially as regards the fulfilment of the seven guiding principles of community conservancy (Box II.1) establishment. Realizing that a CC does not necessarily need to be on a contiguous piece of land, the initial 7 000 ha was extended with additional land from neighbouring Wards 3 and 5 to give 100 000 ha boasting integrated and multiple land uses including settlement and crop lands, wildlife and forests, grazing areas and socioeconomic infrastructure. Communities in the three wards have already gone through participatory mapping which shows the envisaged land uses (Figure II.2).

It is also the intention under the SWM Programme in KaZa to facilitate formalization of a governance body in the form of a trust or association as well as a management body operating in close cooperation with the RDC as the key statutory body. It is however not yet clear what form this governance body will assume, but this has to be in line with recommendations of the recent review of CAMPFIRE, which advocates for acceptable autonomous arrangements at the

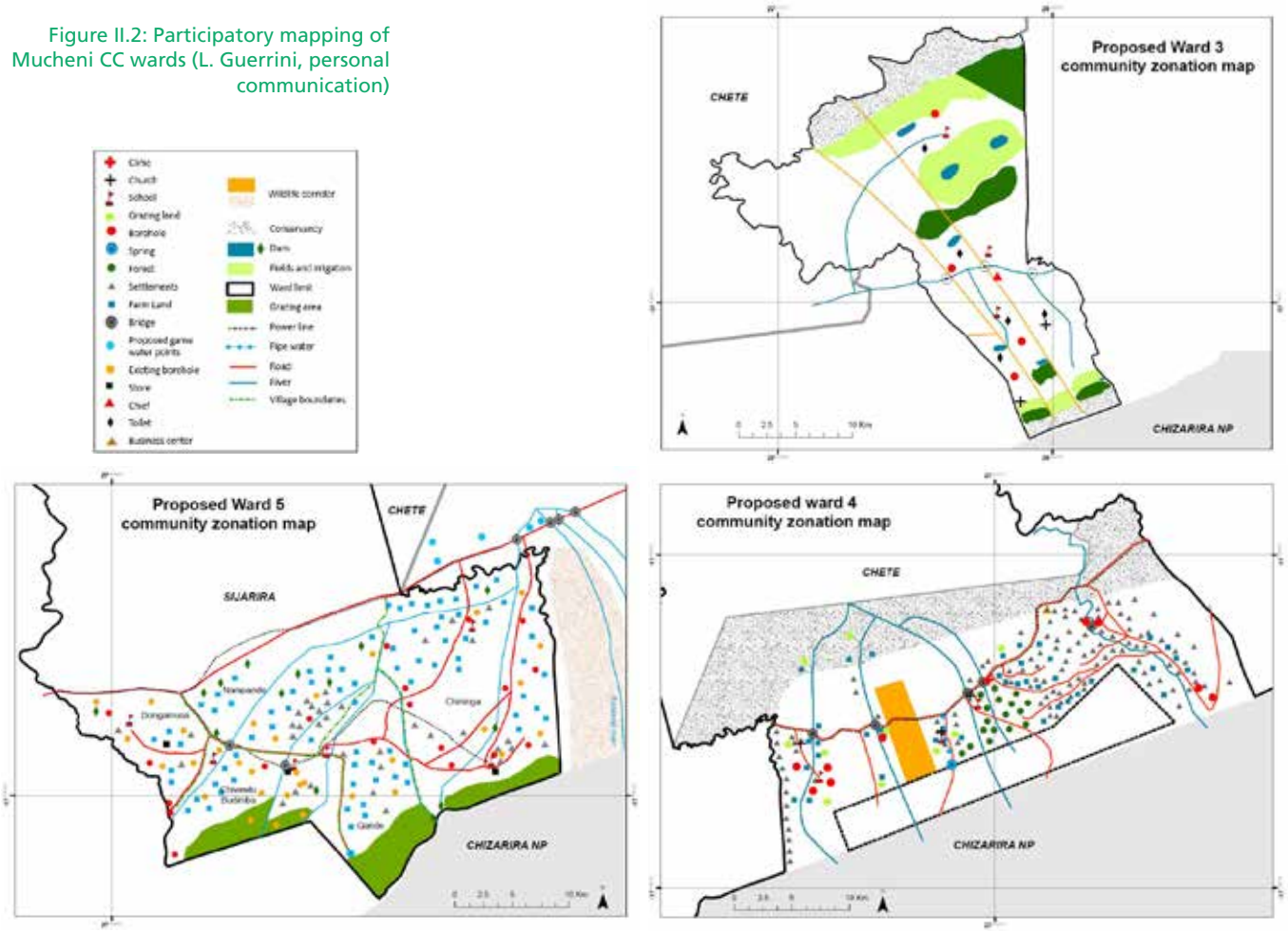
subdistrict level that take advantage of the appropriate authority status of the Binga RDCs. Private–community partnerships are envisaged in value chains such as tourism, livestock and non-timber forest products (NTFPs).

B.2.2.2. In Zambia

The two CCs in Zambia, Inyasemu (ICC) and Simalaha (SCC) Community Conservancies, were inspired by the vision of traditional leaders: two in Simalaha (His Royal Highness – HRH – Senior Chief Inyambo Yeta and HRH Sekute), and four in Inyasemu (the two previous ones and HRH Nyawa and HRH Musokotwane).

SCC is much more advanced in terms of governance and legality: negotiations with communities on the establishment of a CC started in 2009, an agreement on the formation of the 180 000 ha CC was reached in 2012 and, in 2019, the Simalaha Community Conservancy Trust was registered. Subsequently, members of the Village Action Groups (VAGs) were elected as part of the management body of the CC and, together with appointed members from the traditional authorities, they formed the Board of Trustees. The Trust's role is to ensure the transparent and efficient management of the Conservancy, and to ensure that monies being generated through

Figure II.2: Participatory mapping of Mucheni CC wards (L. Guerrini, personal communication)



socioeconomic activities of the CC are shared equitably between all chiefdoms and community members. The NGO Peace Parks Foundation (PPF) is currently providing the Trust with the necessary support until the Trust is able to manage its own affairs.

The establishment of Simalaha Conservancy inspired the traditional leaders of Simalaha to share their workable experience with HRH Chief Nyawa and HRH Chief Musokotwane to explore the possibility of using some 108 300 ha of Inyasemu open land that is shared among the four chiefdoms for the same purpose. Figure II.3 displays the collected geo-referenced features during the participatory mapping occurring on the occasion of the baseline survey (Banda *et al.*, 2019).

After extensive community consultations have been carried out with support of Panthera, PPF and the SWM Programme in KaZa, the traditional leaders are forging ahead to set up a new CC. At the moment the critical issues hinge on the governance structures for the new CC. The Simalaha model is likely to be used given that two of the chiefs are comfortable and were involved in Simalaha – a structure which is beginning to produce results. At the time of writing, the support organization together with the chiefs were organizing to carry out elections of VAGs which are central to the management of the CC if the Simalaha model is used.

B.3. Identification of partner Sustainable Management Units

Across the three CCs there are already many national level institutions regulating legal hunting and sustainable exploitation of wildlife populations and other natural resources, and these must work with communities. In Zambia, the central entity is the Department of National Parks and Wildlife (DNPW) while in Zimbabwe it is the ZPWMA. Their functions include controlling,

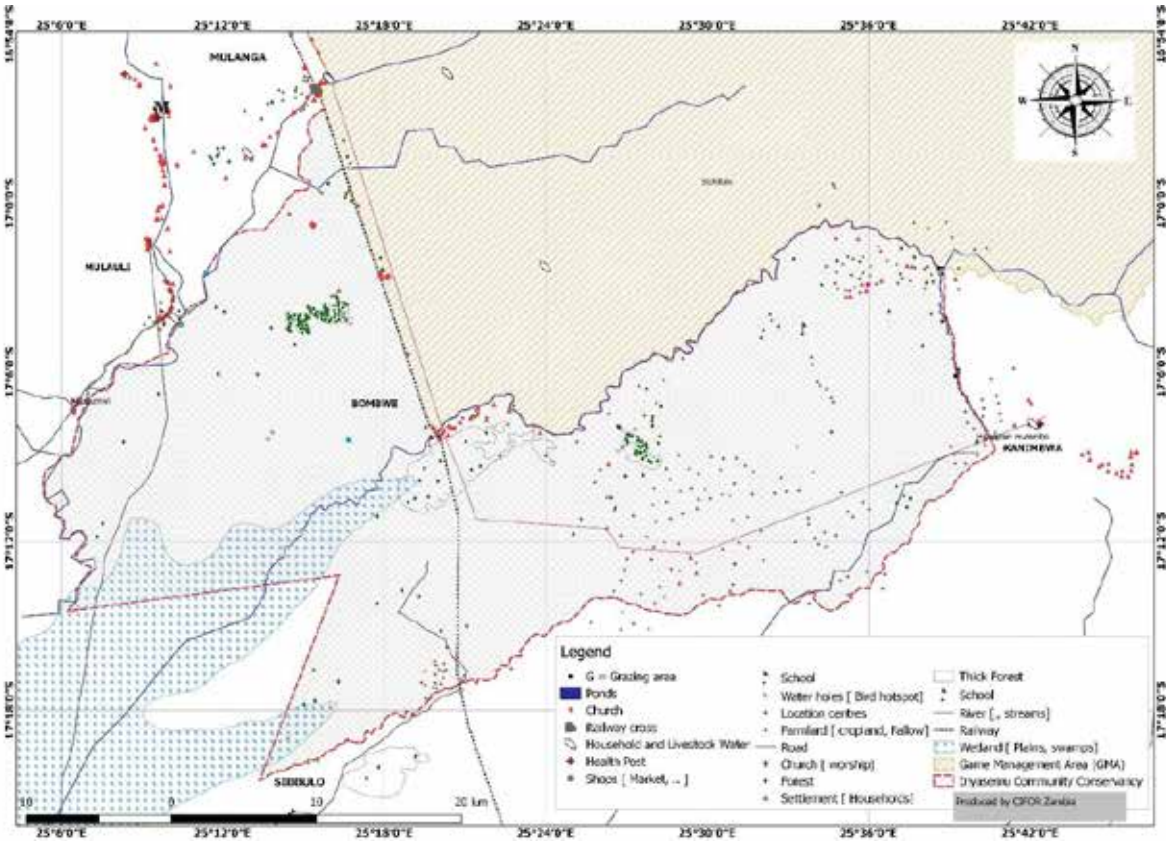


Figure II.3: ICC participatory mapping (Banda *et al.*, 2019)

managing and maintaining parks, sanctuaries, safari areas (SAs) and recreational parks for the purposes of the conservation and utilization of wildlife. While fish resources are covered by ZPWMA in Zimbabwe, this resource falls under the authority of the Department of Fisheries (DoF) in Zambia. Regarding forestry, the key institutions are the Forestry Department and the Forestry Commission in Zambia and Zimbabwe, respectively.

The other government institutions that play a role in wildlife and other natural resources management include the Environmental Management Agencies (EMA) in Zimbabwe and Zambia, both responsible for ensuring the projects and activities carried out are environmentally sensitive and adhere to national laws and regulations. These entities are housed in the Ministry of Environment, Climate, Tourism and Hospitality Industry (Zimbabwe), and the Ministries of Lands and Natural Resources, and Tourism and Arts (Zambia). Private sector operators also run operations in and around the conservancies and these often include safari operators, fishing cooperatives and in some cases community fishing groups.

At the local level, the key institution in wildlife conservation is a democratically established local authority termed RDC in Zimbabwe and the District Council (DC) in Zambia. This structure is supported by traditional leaders and a number of thematic district level sub-committees covering environment and natural resources. The RDCs in Zimbabwe have been given appropriate authority (AA) status under the Parks and Wildlife Act through the CAMPFIRE concept, which gives them rights to utilize wildlife resources in their areas of jurisdiction. RDCs do run CAMPFIRE projects for the benefit of local communities and are empowered to make by-laws on natural resources management following the Rural District Councils Act (1988) and the Environmental Management Act (EMA, 2002). Under CAMPFIRE, communities are empowered to manage locally available natural resources through an institutional arrangement of committees at the ward and village levels. These committees make decisions on biodiversity conservation and wildlife or forest management and protection. In Zambia, the situation is slightly different with specialized structures such as Community Resources Boards (CRBs) and VAGs for wildlife active at local level but closely aligned with the central government (National Parks and Wildlife Act of 2015). For the other natural resources, specific Zambian management committees were established with their respective policies (Fisheries Act of 2011; the Forest Act of 2015).

In both countries, the community level is dominated by traditional systems, customary practices, laws and norms, that are held by chiefs and traditional authorities, who are the custodians of the natural resources and therefore are well positioned to play a vital role in biodiversity conservation and wildlife conservation and protection. However, their mandate in wildlife management is not well defined, although the Traditional Leaders Act of 2001 (Zimbabwe) and the Chiefs Act 1965 (Zambia) mandate them to assist the government in environmental and natural resources conservation. In many cases, customary courts can play a vital role, although in the modern world their roles are overlooked or not sufficiently respected by people involved in illegal hunting and fishing activities (e.g. poachers). The relationship between traditional leaders, as custodians of customary norms, and the District Councils has not always been cordial. Traditional leaders often complain about lack of consultation by the RDC or DC on key decisions related to conservation practices. In Zambia, for instance, the chiefs work directly with the DNPW and, lately, sit on District Council meetings and therefore support the land management decisions that councils have made.

C. Theory of change and assumptions

The theory of change methodology makes it possible to design in a participatory way, with all programme stakeholders in KaZa, what should be the sequence of actions that would lead to the outcomes needed to reach the shared vision and long-term impacts for the KaZa CCs. One workshop was held in each country to build a common vision and decide upon the key activities to reach it (Newberry *et al.*, 2019; Ezzine de Blas *et al.*, 2020). One theory of change common to the two countries has been elaborated. Such a common vision was articulated towards the achievement of the programme's ultimate goals, i.e. increased diversity and abundance of natural resources (wildlife, fish and forests) as well as improved human well-being (supply of protein and alternative sources of revenues). The participation of experts from R1, R5 and R6 Results of the SWM Programme and from other different institutions responded to three complexities that had to be addressed simultaneously:

- The site is part of the KaZa-TFCA and is under the general coordination of CIRAD but divided in the sub-sites of Zambia, led by CIFOR, and Zimbabwe, led by CIRAD.
- The workshop needed to integrate requirements from R6 (local observatories) and Social Safeguards issues (mainly FPIC – Free, Prior and Informed Consent – and CRBA – community rights-based approach).
- The methodological and facilitation approach needed to set the baseline for the theory of change workshops in the other sites of the SWM Programme in KaZa.

In both countries the workshops were attended by 25 people on average, including around 12 percent women, and were dominated by community members, government representatives and NGOs. The workshops were organized in four sessions: (i) introduction and objectives of the workshop – presentation of FPIC expectations; (ii) discussion of human–wildlife issues; (iii) issues at the territorial scale; and (iv) identification of stakeholders, their interactions and impacts. Both in Zambia and in Zimbabwe, thanks to the active participation of the attendants, the theory of change exercise proved useful in identifying grounded actions that are appropriate to the context, the local dynamics and impacts that the Project Document had not identified.

Among the main conclusions:

- Participatory land-use planning or zoning of economic activities, fire management actions and water sourcing were raised as key issues both by representatives of communities and national institutions attending the ToC workshops in both countries.
- Human–wildlife competition was highlighted as one additional issue requiring attention. Calls were repeatedly made throughout the workshop discussions for the SWM Programme in KaZa to proffer some solutions to this aspect. To this end, suggestions such as tightening the zoning of human activities to avoid overlapping on wildlife habitat were made and were subsequently a key consideration under the land zonation exercise. The same workshops also raised the interest for the SWM Programme in KaZa to facilitate the creation of alternative sources of food and income.
- The workshops noted that one of the sources of competition between people, livestock and wildlife was the need for water. Included in this area were grass and grazing for cattle. A cascade of conflicts often emerges as a result of such competition.

There is an important need to clarify boundaries and exclusion rights in the CCs, as well as a

need to have clear mechanisms for accessing resources and income from wildlife.

- Beekeeping also appeared a number of times as a win-win strategy for generating household (HH) income while protecting crops from elephants. However, this activity should be promoted with caution since the groups underscored that villagers are generally scared of bees.
- Other activities mentioned included capacity building for a number of strategic actions, such as fire prevention and control, anti-poaching and planning at community levels, which were to be developed later.

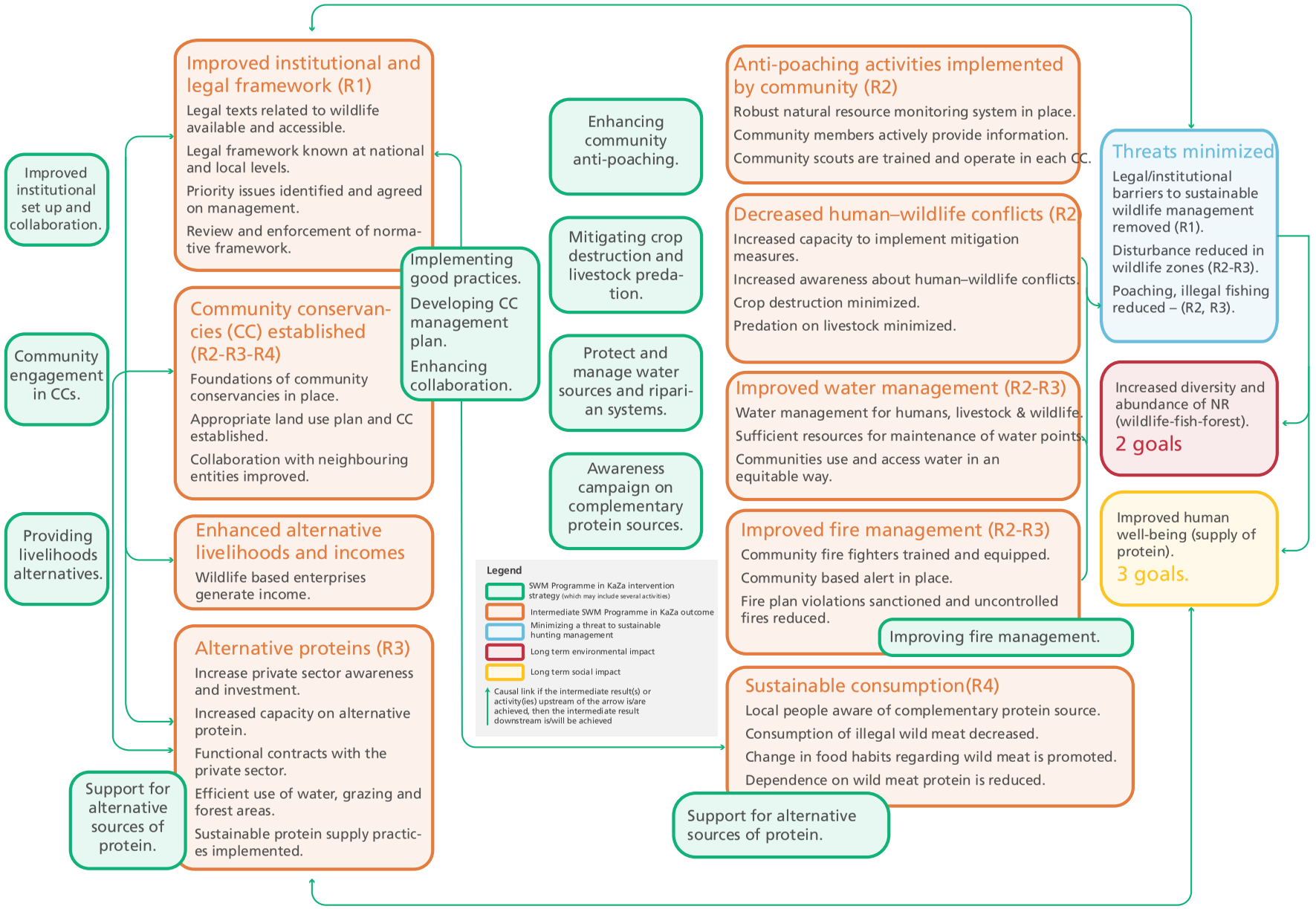
A key area to which the SWM Programme in KaZa aims at contributing is solving the issue of lack of interaction and sharing spaces between the different actors, who often tend to interact separately. To address this issue, a body needs to be established that meets regularly to share information about human–wildlife interactions, the progress of actions taken and identification of new actions. It is however important to highlight that the theory of change exercise is ultimately the result of the participants are present and how they express their views, and not a rigid plan on how to achieve success. The communities and entities must take this to a point of departure and develop executable plans based on their realities.

The participation of different persons or institutions produced similar but also different results in the two countries. Nevertheless, the strong convergence of the two theory of change exercises supports their coherence and validity. Figure II.4 presents the current theory of change, elaborated towards achievement of the ultimate goals of the SWM Programme in KaZa, previously mentioned and to be found at the bottom-right of the figure. As the process is a continuous/iterative one, annual meetings will take into account the outcomes of the activities according to their implementation, or to their changes, through adaptive management.

This graph is organized in three columns, each of them being linked to the other and demonstrating strong linkages and subsequently interactions with the other two, as symbolized by arrows: (i) the left column maps the intermediate outcomes with the corresponding domains of Results (the "Rs"); (ii) the middle column focuses on concrete actions to be addressed through technical R domains (R1 to R4); and (iii) the right column presents in addition to the ultimate goals previously announced the threats to be minimized during the implementation of the SWM Programme in KaZa. The theory of change is a dynamic process that needs to be updated as the results in the different technical Rs are obtained:

- **R1:** In both countries, relevant laws are analysed through a legal matrix and the gaps and impediments identified for the promotion of a CC model. These are part of the process of harmonizing national legislation and regulatory frameworks, involving national or subregional authorities (e.g. KaZa-TFCA) in charge of applying the Acts in the respective countries.
- **R2:** Innovative models for the sustainable uses of wild species resilient to hunting or fishing (WSRHF) and the safeguarding of protected and endangered species are co-developed and implemented at CC and village levels. Innovative approaches addressing human–wildlife conflict (HWC) are promoted to address the constraints of sharing space and resources with wildlife.
- **R3:** A favourable environment is created for the development of sustainable livestock, forest foods and aquaculture sectors as alternative sources of protein and income, with a particular focus on small-scale animal husbandry. The sources of these alternative proteins are enhanced and better managed.

Figure II.4: Theory of change of the SWM Programme in KaZa – Overall 2019 (adapted from Newberry et al., 2019 and Ezzine de Blas et al., 2020)


Improved institutional and legal framework (R1)
Legal texts related to wildlife available and accessible.
Legal framework known at national and local levels.
Priority issues identified and agreed on management.
Review and enforcement of normative framework.
Improved institutional set up and collaboration.
Implementing good practices.
Developing CC management plan.
Enhancing collaboration.
Community conservancies (CC) established (R2-R3-R4)
Foundations of community conservancies in place.
Appropriate land use plan and CC established.
Collaboration with neighbouring entities improved.
Community engagement in CCs.
Enhanced alternative livelihoods and incomes
Wildlife based enterprises generate income.
Providing livelihoods alternatives.
Alternative proteins (R3)
Increase private sector awareness and investment.
Increased capacity on alternative protein.
Functional contracts with the private sector.
Efficient use of water, grazing and forest areas.
Sustainable protein supply practices implemented.
Support for alternative sources of protein.
Enhancing community anti-poaching.
Mitigating crop destruction and livestock predation.
Protect and manage water sources and riparian systems.
Awareness campaign on complementary protein sources.
Legend
SWM Programme in KaZa intervention strategy (which may include several activities)
Intermediate SWM Programme in KaZa outcome
Minimizing a threat to sustainable hunting management
Long term environmental impact
Long term social impact
Causal link if the intermediate result(s) or activity(ies) upstream of the arrow is/are achieved, then the intermediate result downstream is/will be achieved
Anti-poaching activities implemented by community (R2)
Robust natural resource monitoring system in place.
Community members actively provide information.
Community scouts are trained and operate in each CC.
Decreased human–wildlife conflicts (R2)
Increased capacity to implement mitigation measures.
Increased awareness about human–wildlife conflicts.
Crop destruction minimized.
Predation on livestock minimized.
Improved water management (R2-R3)
Water management for humans, livestock & wildlife.
Sufficient resources for maintenance of water points.
Communities use and access water in an equitable way.
Improved fire management (R2-R3)
Community fire fighters trained and equipped.
Community based alert in place.
Fire plan violations sanctioned and uncontrolled fires reduced.
Improving fire management.
Sustainable consumption(R4)
Local people aware of complementary protein source.
Consumption of illegal wild meat decreased.
Change in food habits regarding wild meat is promoted.
Dependence on wild meat protein is reduced.
Support for alternative sources of protein.
Threats minimized
Legal/institutional barriers to sustainable wildlife management removed (R1).
Disturbance reduced in wildlife zones (R2-R3).
Poaching, illegal fishing reduced – (R2, R3).
Increased diversity and abundance of NR (wildlife-fish-forest).
2 goals
Improved human well-being (supply of protein).
3 goals.

- **R4:** The consumption of wild meat is matched with the sustainable production capacity of wild species and balanced by livestock farming, forestry and aquaculture products. Legal provision of wild meat through specialist shops and restaurants is regulated and promoted.

The **R5 team** (Monitoring, Evaluation and Learning) assists the site coordinator and his/her team to coordinate the development of site-level theory of change, and identify a set of associated indicators. A regularly updated effectiveness scorecard allows having an annual follow-up of the activities conducted in both Zambia and Zimbabwe. A set of indicators in the theory of change makes it possible to monitor and track implementation of the SWM Programme in KaZa and help adapt to the dynamic and ever-changing context of the SWM Programme in KaZa in all the domains to be presented in the subsequent chapters.

D. SWM Programme in KaZa approach towards local beneficiaries

A CRBA has been developed for the SWM Programme. This CRBA includes a specific protocol on FPIC, which is a continual process that involves mutual respect and meaningful participation of Indigenous Peoples in decision-making on matters affecting them. The CRBA and the FPIC have been used in the site of the SWM Programme in KaZa since 2018 during the first theory of change workshops held in both Zambia and Zimbabwe as part of ensuring that stakeholder buy-in was obtained.

Since then, the SWM Programme in KaZa has deliberately mainstreamed CRBA and FPIC into all the result areas of the programme through provision of accurate information on which stakeholders make decisions and provide consent to be part of programme interventions. The FPIC was not completely new to the facilitating partners as permission/consent has always been sought to work with communities, but SWM project-related activities brought the community engagement process into sharper focus (including documenting the agreement), even though no official agreement has been signed yet. The central institutions involved in the development of the CCs laid the basis for both CRBA and FPIC.

In Zambia, the strong role of traditional chiefs provided convening power and brought an early centralization and lobbying for the programme idea. To begin with, the chiefs agreed among themselves to set up the two conservancies though at different times. With their customary power and respect, they were able to rally other institutions including the government to work with them on the idea. SCC's Trust ropes in all the key stakeholders with the communities represented by VAGs; a similar representative Trust is proposed for ICC and the chiefs will be signing a four-way Memorandum of Understanding (MoU) to cement their agreement. These discussions do not exclude the key institutions such as the Department of National Parks and Wildlife, Fisheries and Forestry Departments, and Kazungula and Mwandi District Councils, which remain as key supporters of the projects. To these can be added private sector entities such safari operators, fishing companies and livestock companies such as abattoirs. It is important to mention that PPF has been active in facilitating the setting of SCC, now joined by Panthera and CIFOR under the SWM Programme in KaZa for ICC.

In Zimbabwe, similar processes were followed in Mucheni but the centralizing document is the MoU with Binga RDC, which is signed annually and provides the framework under which the SWM Programme in KaZa should operate. The SWM Programme in KaZa also works through

existing structures of the Council, created by the Environmental Management Act: the Binga Environmental Management Committee (BEMC), which reports to the full Council, the Ward Environmental Management Committee (WEMC) at the ward level, and the less functional Village Environmental Management Committees (VEMCs) at the village level. At the local level, the project also works with the resource monitors who ideally should be the technical/operational part of the WEMCs and VEMCs and report their activities to these institutions. Interaction with traditional leadership (chiefs and village heads) is through the village and ward assemblies as well as through the Ward Development Committee (WARDCO). At the district level, the project works with relevant public and civil society organizations through the Council and the Binga Rural District Development Committee (BRDDC) chaired by the District Development Coordinator. Some relevant public stakeholders include ZPWMA, Forestry Commission, Department of Agricultural, Technical and Extension services (AGRITEX), Department of Veterinary Services and EMA. There are also links with the Provincial Development Coordinator and the National Focal Point who are based at the Ministry of Environment Climate, Tourism and Hospitality Industry (MECTHI). The project is also open to other functional linkages and arrangements such as with the private sector, who are perceived as the major potential drivers of markets and business development interventions envisaged under the project.

The stakeholder analysis (SWM, 2020) identified in both countries key stakeholders, a combination of rights holders and duty bearers, who have significant interaction with the project at the various levels mentioned above (village, ward, district, provincial, national and regional). They are as follows:

- The rights holders (local communities) are the stakeholders that are directly dependent on the resources at stake (in particular wildlife, forests, water and soil) and as such hold claims on the resources through various statutory and customary rules. Some of these are embodied in customary laws and traditional rules that bestow power on traditional leaders vis-à-vis resource management. These roles have been fortified by the state though the Traditional Leaders Act, Communal Lands Act (Zimbabwe) and Chiefs Act (Zambia) which highlight the interests/expectations of this category of stakeholders, and their possible impacts and influences on the project are rated on a scale of low, medium and high. The analysis generally notes the high impact and influence that the rights holders have on implementation of the project. This analysis also highlights how the stakeholders could contribute to the success of the project (by taking ownership of the project) and possible hindrances they could cause to this success. An engagement strategy is proposed for the rights holders, and stakeholders to be contacted for interaction and continuous engagement (for example, through meetings, workshops and site visits) throughout the life of the project are listed in an analysis matrix (SWM, 2020). The aforementioned stakeholders include traditional leaders (chiefs and village heads), political leaders (councillors), local-level environment institutions and the beneficiaries themselves (the community at large).
- The duty bearers are composed largely of the public, private and civil society stakeholders (who have a particular obligation or responsibility to respect, protect and fulfil rights of the poorest, weakest, most marginalized and vulnerable); these are listed in the analysis matrix. As in the case of the rights holders, their expectations/interests as well as their possible impact and influence on the project are highlighted. It is observed that the impact and influence of the stakeholders in this category cut across the three ratings (low, medium and

high) depending on how closely the stakeholder interacts with the project. For example, in Zambia, the impact and influence of the SWM Programme in KaZa (through CIFOR), NGOs Panthera and Peace Parks Foundations (PPF), and Government departments are very high because these institutions almost always work with the stakeholders by attending meetings together and having combined field missions.

In Zambia, public stakeholders include the Ministry of Tourism and Arts, especially the Department of National Parks and Wildlife, Ministry of Lands and Natural Resources (Forestry Department), Ministry of Local Government, Ministry of Livestock and Fisheries (Department of Fisheries – DoF – and Department of Livestock and Veterinary Services – DLVS, respectively) and the Department of Agriculture. The public stakeholders also include representatives from the Provincial and District levels of Government departments. In Zimbabwe, public stakeholders include BRDC, the Ministry of Local Government, Rural and Urban Development (MLGRUD), MECTHI and its parastatals (Parks and Wildlife Management Authority and the Forestry Commission), AGRITEX, DLVS and the EMA. The public stakeholders also include representatives from the provincial and national levels of the MLGRUD and MECTHI, respectively. The Ministries in charge of environment are the focal points of the SWM Programme in KaZa in both countries and they provide policy and technical guidance to the programme.

Civil society stakeholders who are also duty bearers have been described in the same way as the previous stakeholders. The civil society organizations include the African Landscape and Environmental Research Trust (ALERT), National Parks Rescue (NPR), World Wide Fund for Nature (WWF), PPF and Panthera. The matrix also identifies the key private sector stakeholders that could also be categorized as duty bearers (and very important in driving value chains) and does a similar analysis as in the case of the other stakeholders.

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III. PRESENTATION OF THE INTERVENTION SITE

Patrice Grimaud, Davison Gumbo, Maxwell Phiri and Penias Banda

Introduction

The SWM Programme in KaZa is being implemented in Zambia and Zimbabwe. It is promoting the model "Community conservancy as a basis for a nested wild and domestic meat supply promoted for protein and income". The sites are, in Zambia, Inyasemu and Simalaha Community Conservancies, and in Zimbabwe (Binga), Mucheni Community Conservancy. The two countries are part of the KaZa zone, and the link with the KaZa-TFCA Secretariat in terms of wildlife conservation is of major interest. The three conservancies are at various levels in their development, and points of similarity and difference among these three CCs in terms of geographical, biophysical and human environment can be described.

Materials and methods

This chapter is based on several studies that have been conducted by the SWM team in KaZa and by experts contracted from the beginning of the programme in order to have the best possible knowledge of the environment in which the users of these conservation areas live, whether they are human populations, the livestock raised or the wildlife present. A landscape approach was systematically chosen for the conduct of these various studies in order to provide information to the political leaders as well as to the traditional chiefs, their councillors, and the village communities that depend on them. The aim was also to inform all of them of the various missions that took place in the field to collect the information. Meetings and interviews were held in respect of the social safeguards. The main studies on which this chapter is based are as follows:

- The ecological environment of Chizarira and Inyasemu landscapes (Mafigu, 2018; Namukonde, 2020);
- Hydrological assessment of Wards 3, 4 and 5 of Binga district and Inyasemu (Dzvairo, 2019; Sinda, 2020);
- Chizarira landscape consultative process (Cunliffe, 2019);
- The stakeholders' analysis in both countries (SWM, 2020); and
- Some additional information also comes from the atlas: *The mankind and the animal in the mid-Zambezi valley* (CIRAD, 2000).

A. Geographical environment

A.1. KaZa-TFCA

Southern Africa covers 6.8 million km² of land encompassing 12 countries all of which belong to the Southern African Development Community (SADC). The region sits on the southern African plateau characterized by rugged terrain, mountains, steep cliffs and river valleys, as well as flatlands on the bottom slopes that are widely used for cropping and pasture. In addition, the

terrain also presents a mosaic of grasslands, wetlands and woodlands that offer habitats for a wide range of wildlife species, including buffaloes, elephants, leopards, lions and rhinoceroses. Other species include antelopes, giraffes, hippopotamuses and various cats, which have become the basis of wildlife-based tourism in this region.

Wildlife-based tourism is the key economic activity, generating over USD 29 billion annually for southern Africa and employing 3.6 million people, and lately rural communities have begun to claim a stake in these ventures. Communities have benefited from wildlife and other natural resources through strategic government-supported policy interventions that helped the region to pioneer the involvement of communities in natural resources management. With close to 14.8 percent of the region's land mass under protected area (PA) status (forest and wildlife), the adjoining communities have over the years been actively collaborating with the respective central governments and this is the hallmark that forms the cornerstone of this sector (SADC, 2006).

Since inception, the region has been developing innovative ways of delivering effective nature conservation, and adopted the concept of transfrontier conservation areas, as laid out in the SADC Protocol of 1999 (SADC, 1999), that promotes shared cross-border conservation efforts. Most PAs in the region, as elsewhere in the world, are largely state-owned and managed often with various permutations of support from private sector, e.g. tourism, hunting/safari operators and other entities. Some of the PAs are located on borders, often enabling the seasonal movement of animals in search of food or required habitats, an aspect which was happening before the PA boundaries were put in place. This was noted by natural resources and wildlife management experts in SADC and considered as a basis for collaborative management of

Figure III.1: Map of KaZa-TFCA (*Source:* ww.peaceparks.org)

shared natural and cultural resources across international boundaries for improved biodiversity conservation and socioeconomic development.

One such area is the 520 000 km² wide Kavango-Zambezi Transfrontier Conservation Area (KaZa-TFCA) which was created from adjoining PAs in Angola, Botswana, Namibia, Zambia and Zimbabwe, and which is the largest transfrontier conservation area in the world (Munthali *et al.*, 2018). This area includes a major part of the Upper Zambezi River and Okavango Delta, the Caprivi Strip of Namibia, the south-eastern part of Angola, south-western Zambia, the northern wildlands of Botswana and western Zimbabwe (Figure III.1). The key objective of the KaZa-TFCA is to join fragmented wildlife habitats to form an interconnected mosaic of protected areas and transboundary wildlife corridors. The TFCA is headed by a secretariat based in Kasane, Botswana, which oversees the development and management of a series of wildlife dispersal areas as part of the conservation efforts for the member countries.

Following this monumental achievement and some fundamental rethinking in the region, smaller but more people-centred and managed CCs were suggested, introduced and adopted. This is a further desire to encourage and facilitate the direct involvement of rural people in natural resources management, and marked an important milestone in nature conservation, poverty reduction and empowerment in sub-Saharan Africa. Community conservancies, like the PAs before them, acknowledge the importance of ecological, physico-geographical and socio-cultural, anthropogenic factors that influence a specific area being managed by the communities that live within them for their own benefit (Sandwith *et al.*, 2001).

A.2. Community conservancies in Zambia and Zimbabwe

The two countries share a common boundary dominated by the Zambezi River, and have been facing similar threats to natural resources management in general and wildlife in particular. The major threats include habitat loss and/or degradation, excessive resource extraction, fragmentation, encroachment, poaching and climate change (Lindsey *et al.*, 2014). These factors, combined with poor governance, poverty, increasing human and livestock populations and illegal wildlife trade, continue to drive the loss of wildlife and the degradation of other natural resources in the region (Robson *et al.*, 2017). In particular, the increasing loss of large mammals that are central to ecosystem functions affects tourism in the region.

The potential CC sites in Zambia and Zimbabwe are linked to a broad range of PAs – from national parks, forest reserves and game management areas (GMAs) – and seek to address the management of habitat loss, degradation, fragmentation, encroachment, poaching and climate change.

B. Biophysical environment

B.1. General description

Under this initiative, the three CCs cover a combined area of 388 300 ha, of which Mucheni with 100 000 ha is the smallest and Simalaha with a coverage of 180 000 ha is the largest (see Figure II.1). As with much of southern Africa, conservancies are located in similar biophysical

environments where physiographic features, soil characteristics, bioclimatic types and length of the growing period are critical attributes for wildlife (Muimba-Kankolongo, 2018). The CCs are located on rugged topography in dry zones. Mucheni is in Agroecological Zone (AEZ) 5, the driest category in Zimbabwe, while both Inyasemu and Simalaha are in Zambia's AEZ 1, which is also the driest category in Zambia. With rainfall in both zones varying from 400 to 700 mm, the recommended land use is less cropping but more livestock rearing and wildlife. The more specific descriptions of these key features are given in the sections below.

B.1.1. Climate

Rainfall across these sites – 400 to 700 mm – is considered low for arable cropping. Mucheni is a little wetter and reaching up to 1 400 mm in the abutting landscapes, e.g. Chizarira, while Inyasemu is the driest CC. Three distinct seasons are typical: (i) a warm wet season from November to April; (ii) a cold dry season from April to August; and (iii) a hot dry season from September to November. Climate models project that minimum and maximum temperatures in these areas could go up by anything between 10 °C and 30 °C by 2060 (Hulme, 1996), increasing the frequency and intensity of fires (Davis-Reddy and Vincent, 2017). Total annual rainfall is predicted not to change significantly, but the variability is expected to increase, leading to more droughts as well as to increases in the frequency of heavy rainfall events, which in turn may lead to an increase in floods (Davis-Reddy and Vincent, 2017).

The vulnerability of these CCs to such climatic changes is high compared to most other parts of the two countries due to their already limited agricultural potential and as indicated due to the fact that they lie in zones that are considered as more suitable for wildlife and livestock rearing.

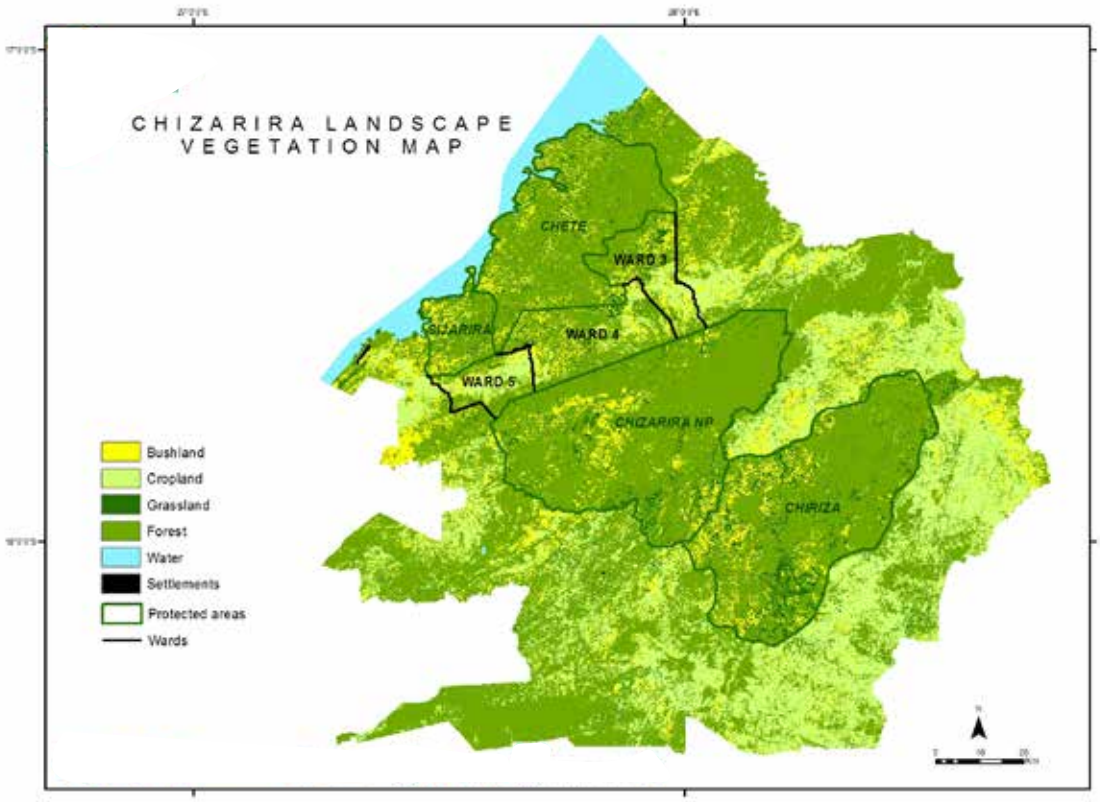

Figure III.2: Chizarira landscape vegetation map (*Source:* L. Guerrini; in Mafigu, 2018)

B.1.2. Ecosystem

The three CCs share similar types of vegetation dominated by dry forests and woodlands. The *Colophospermum mopane* woodlands are dominant and are found in the lowlands at elevations between 170 m to 800 m above sea level (Makhado *et al.*, 2014) while the miombo (the genera *Brachystegia* spp., *Julbernardia* spp. and *Isoberlinia* spp.) is met at higher altitudes of between 600 and 1 400 m above sea level (Chidumayo and Gumbo, 2010). In addition, riparian woodlands dominated by species such as *Diospyros mespiliformis*, *Khaya anthotheca*, *Parinari* spp. and *Syzygium cordatum* are found often along rivers, streamlines and grasslands. Other woodland types, albeit in small patches, include *Vachellia* spp., *Terminalia* spp. and *Combretum* spp. in various combinations. Soils under these vegetation types vary from light textured under miombo to clayey under mopane and vachellias. Tree heights vary with soil depth and effective rainfall. Under the best conditions, trees have heights ranging from 6–10 m, while under the worst conditions they are usually shrubby with a height range of 2–6 m and these are more pronounced in the mopane and the mixed thickets. An illustration of this ecosystem is given Figure III.2 in Zimbabwe, with PAs surrounding the three wards of Mucheni CC.

B.1.3. Natural resources

The vegetation described above provides habitats to a broad range of wildlife species across the three CCs. These range from mammals, birds, amphibians and reptiles to invertebrates, and some of these have a high conservation status as per the International Union for Conservation of Nature and Natural Resources (IUCN) Red List (IUCN, 2016). It is noted however that the populations of large and medium-sized mammals are extremely low, as only a few species may still be in existence with stable populations. These include woodland ungulates, namely kudu and common duiker, primates, namely vervet monkeys and baboons and carnivores. There are therefore many opportunities of contact between rural communities and wildlife which has over the years provided for the development of hands-on human–wildlife conflicts (HWC) mitigation measures. Although these attributes are common across the CCs, some subtle differences can be noted which are addressed in the sections below.

B.2. Inyasemu Community Conservancy (ICC)

Located in Kazungula District, in the Southern Province of Zambia, Inyasemu CC is 108 300 ha in extent and lies at an elevation of 900 to 1 200 m above sea level. It was established by four chiefs (namely, Senior Chief Inyambo, HRHs Nyawa, Sekute and Musokotwane, whose names' first syllables give the CC its name: Inyasemu). The CC lies on the Simalaha floodplain and shares boundaries with Sichifulo GMA, the Bombwe and Martin Tunga Forestry reserves. Given that position, it is part of the TFCA Wildlife Dispersal Area (WDA) which is an area defined as a unit of land where wildlife animals either breed or have their key habitat, and part of the thrust of the TFCA is to restore transboundary wildlife migratory corridors between such WDAs (Munthali *et al.*, 2018; KaZa-TFCA, 2014). Conversations are still ongoing with traditional leaders and the communities but studies carried out show its potential (Namukonde, 2020).

B.2.1. Climate

Zambia has three AEZs and the ICC lies in Zone 1 which is characterized by mean annual rainfall of less than 600 mm and experiences temperatures of between 20 °C–25 °C (Mukosha and

Siampale, 2009). The total and distribution of rainfall within a season vary greatly from year to year in this AEZ. The seasons defined above for all the CCs are significantly different except for the fact that highest precipitation and temperatures in some instances have been reported to last for seven months from October–November to April. Relative humidity is highest during the hot wet season (more than 70 percent in January) and lowest in the hot dry season (less than 36 percent in September). The area predominantly receives north-easterly winds whose speeds range from 6–11 m/s and begin to accelerate towards the end of the cold dry season. As with the rest of Zambia's Southern Province, climate change is affecting the region. It is likely that variability will increase and cropping will become even harder to realize.

B.2.2. Ecosystem

Inyasemu CC ecosystem is largely influenced by the annual seasons and the associated distribution of water, soils and human activities that, in turn, influence the distribution of the flora and fauna and their interrelationships. The ecosystem is endowed with a diversity of vegetation types that serve as unique habitats for wildlife and offer a number of ecosystem products and services to the local community. The main vegetation types are pretty much as described in the sections above, but, in the ICC, the miombo woodlands are found in the eastern part of the conservancy while the more dominant mopane woodlands are located in the western part of the conservancy. The area also has other forests such as *Baikiaea* forests confined in several patches to the north, west and central parts of the conservancy. The conservancy does hold some riparian forests which are confined to major rivers and tributaries. Grasslands are prominent on the western boundary of the conservancy around rivers and streams. Human habitation and cultivated lands are heavily concentrated along major rivers and streams creating a man-made or human-induced habitat.

The Sichifulo, Machile and Lunungu Rivers and their tributaries provide the main water sources for Inyasemu CC including its surrounding areas. Tributaries of these major rivers dry up during the early dry season, but often several pools are left in the main river courses and may last well into the hot dry season. However, in recent years these pools on and along the main river courses have been reported to be drying much earlier with changes in climate (variation in rainfall and general decrease in amounts). In addition, livestock grazing and increased settlements along the main rivers (mainly for seasonal agriculture) have contributed to the siltation of the main rivers and streams in the conservancy. The drainage system, including the wetlands, provides habitats for wildlife and communities who have settled to cultivate close to the river, creating a possible HWC problem.

B.2.3 Natural resources

The baseline survey (Banda *et al.*, 2019) report shows that natural resources for the ICC vary from forests and woodlands products, to fish and wild animals. Iconic tree species include the baobab, and other fruit trees that are of value to the communities. These have hardly been exploited, with the exception of tubers like lusala (*Dioscorea hirtiflora*) and munkoyo (*Rhynchosia heterophylla*) (Banda *et al.,* 2019; Mulenga, 2020). The ICC's rivers and streams hold limited fish species, but *Oreochromis niloticus* and *O. andersonii* have been noted (de Verdal *et al.*, 2018). The major natural resource in this CC is wildlife which has been estimated to be over 30 mammals, 413 birds, 60 amphibian and reptile, and 900 invertebrate species. Of these, 14 have a high conservation status (Namukonde, 2020) and are often encountered around water pools,

in cultivated lands, forests and woodlands. Most of the wildlife that existed in the proposed ICC seems to have shifted its distribution to the north, in Sichifulo GMA where a number of large and medium-sized mammals still exist. Inyasemu CC has the potential to re-establish wildlife populations, given that the conservancy still hosts viable habitats (large-to-medium-sized forest and woodland for ungulates and carnivores) and populations of a few large and medium-sized mammal species. Therefore, there is a need to establish mechanisms and strategies that will reduce illegal harvests and settlements. People are largely rural and carry out activities based predominantly on extensive mixed agricultural production (rain-fed crop production, livestock rearing, even though agriculture is quite challenging in ICC due to erratic rainfall, poor soils and frequent droughts in the area) and use of natural resources (seasonal fishing and hunting), as presented in Chapter VII.

B.3. Simalaha Community Conservancy (SCC)

The Simalaha Community Conservancy (SCC) spans the chiefdoms of the Sisheke Chiefdom (located in the Mwandi District) and Kazungula districts. It provides a corridor between the Chobe National Park (NP) in Botswana and Kafue NP in Zambia. Established by Senior Chief Inyambo Yeta and HRH Sekute, the CC is one of the first community conservancies in Zambia. It is under one of the country's oldest and most structured traditional natural resource management systems. As part of KaZa's Zambezi-Chobe floodplain WDA, the SCC encompasses large areas of seasonally inundated lands. It is one of the first entities to re-establish wildlife populations and their migration routes.

B.3.1. Climate

Simalaha CC lies in AEZ 1 of Zambia and, as already observed, is best suited for livestock and wildlife rearing. With a mean annual rainfall of 600 mm to 800 mm, arable agriculture is severely limited. Rainfall is usually erratic and poorly distributed, resulting in frequent dry spells in the conservancy. Temperatures are not any different from Inyasemu; they average around 16.4 °C, but can peak at up to 32.0 °C or beyond. Cropping is difficult in this terrain although local communities still carry out some agriculture activities.

B.3.2. Ecosystem

The ecosystem of SCC is similar to that of ICC which is largely influenced by seasonal changes. SCC, which is part of the semi-arid plains of Mwandi District in the Western Province of Zambia, is heavily influenced by the Zambezi River with predominantly infertile soils, mainly coarse sands, and alluvial. There are also portions of slightly acidic loamy and clayey soils with loamy topsoils. The SCC faces challenges such as "slash and burn" agriculture, deforestation and poaching, which lead to loss of soil fertility, decreased water retention and, as a result, loss of income and increase in households' vulnerability. These have had negative impacts on biodiversity, wildlife habitat and ecological corridors, thus negatively affecting tourism potential, again causing a potential loss of income.

B.3.3. Natural resources

The SCC is dominated by the Simalaha floodplain, bordered by mopane woodland and mixed woodland vegetation which forms important wildlife habitat. The SCC has valuable plants (including timber) and animal species, but wildlife population densities are relatively low at present. Thus,

there have been efforts to translocate animals from other regions so that benefits are to be realized from their sustainable use. The first wildlife restocking in the conservancy (100 impalas, 135 blue wildebeests and 50 zebras) was jointly operated in 2013 by the government and the private sector, mainly Peace Parks Foundation (PPF). More than 1 200 animals have been reintroduced since then with over 1 600 head of game reported in the animal sanctuary as of 2020. No quota for wildlife hunting has yet been allocated by the government to the Simalaha CC, as wildlife numbers are considered in need of supplementing by more translocations for consumptive offtake to occur. The rural economic base also includes livestock production and fish production, through 19 community-owned fishponds with capacity for 27 tonnes of annual fish production and the potential of numerous natural water reservoirs suitable for fish farming/production, including the potential Zambezi River fish reserves; these activities are supported by good accessibility. Agriculture is challenging, as the area has poor soils and some conflict with the wildlife that is present.

B.4. Mucheni Community Conservancy (MCC)

The 100 000 ha Mucheni CC lies in Wards 3, 4 and 5 of the communal areas of Binga District in Matabeleland North province of Zimbabwe, adjacent to Chizarira National Park (NP), Chete Safari Area (SA) and Sijarira Forest. The MCC lies at an altitude of 480 m in the low-lying areas to 1 439 m at Mt Tundazi on the Chizarira escarpment (Mafigu, 2018).

Wildlife populations and benefits accruing to the community had nearly disappeared in the wards due to poaching, mostly in Chete SA. The community came together under the Ward Development Committee with guidance from the local councillor and Chief Sinansengwe (in Ward 4) and decided to form a community conservancy as a solution. The process was initiated in 2014. After four years, poaching has reportedly been reduced and wildlife sightings have increased. HWC occurs within MCC mainly at water points and in fields; the main problem animals include elephant, baboon, hippopotamus, lion and hyena.

B.4.1. Climate

The climate of Binga, like the other two CC sites, is semi-arid with rainfall varying from 400 mm to 600 mm annually, although higher figures have been recorded in the adjacent Chizarira NP which is at a higher altitude. Rainfall season is from late October to March of the following year although changes have been noted which can be attributed to climate change, and lately floods were experienced in the area. Temperatures range from an average of 20 °C in winter and 30 °C in summer, reaching 45 °C during the hot dry period.

B.4.2. Ecosystem

The southern part of the MCC starts on the foot of Chizarira escarpment and along major rivers such as the Mucheni, Lwizilukulu, Chininga, Kasanse and Mbalule. The escarpment is deeply dissected by spectacular gorges that in some places are over 100 m deep. Both large and small river systems support enclaves of riparian gallery forest beginning at the base of the escarpment with distribution determined by the presence of alluvial soils. Gallery forest is also present downstream of perennial springs that also rise at the foot of the escarpment. The natural vegetation is predominantly mopane and miombo woodlands with some patches of *Combretum* species. Although highly diverse with dominant species determined by altitudinal and topographic variance, vegetation is broadly categorized as *Combretum*, Jesse bush (Lowveld

scrub including *Vachellia*), miombo (*Brachystegia* spp. and *Julbernadia* spp.), mixed (including *Adansonia* spp., *Acacia nigrescens*, *Lonchocarpus* spp., *Terminalia* spp.), *Colophospermum mopane*, and Riverine (gallery) Forest (Deacon *et al.*, 2020). The rocky outcrops and highlands are covered with thick mixed woodland *Commiphora* species and *Sterculia* spp. This veld is characterized by diverse species including grasses that are palatable throughout the year thus presenting a typical sweetveld. Vegetation further reflects land use that includes pristine wilderness through to substantially altered landscape, where it has been cleared for agriculture. Within the boundaries of the MCC there is also an area of reclaimed wilderness that was previously used for agriculture and human settlement.

B.4.3. Natural resources

The MCC is heavily influenced by the adjacent national park, forest reserve and safari area and the associated ecological systems. The entire landscape is dominated by a broad range of animals varying from elephant, buffalo, lion, leopard, wild dog, spotted hyena, hippo, kudu, roan antelope, bushbuck, waterbuck, to the common duiker, impala. As with most of these human-settled areas, there has been a dwindling of the wild species' numbers due to factors such as drought, poaching and the lack of water. There are indigenous fruit trees available in MCC such as *Adansonia digitata* (baobab), *Tamarindus indica* (tamarind), *Berchemia discolor* (the bird plum) and *Sclerocarya birrea* (marula). These could be commercially exploited under an appropriate model and contribute to improvement of livelihoods of people.

C. Human environment

C.1. General description

The people in the three CCs live off the land, but cropping and livestock still remain as major activities. Arable agriculture is challenging, as the three areas have poor soils and often experience severe droughts which are worsening due to climate change. Due to the presence of wildlife, issues pertaining to HWC are prevalent. Across the CCs, poverty remains a major challenge as most of the households (HHs) can be classified as "asset poor". Most of these households are vulnerable not only because of their relative poverty, but also because they have few assets to sell should they be forced to find money for food or other emergencies. Some residents have livestock as their number one asset. Water is primarily sourced from boreholes, followed by shallow wells on and along river channels. Some water is drawn from the rivers when the rains are in abundance.

Across the CCs, tribal leaders are recognized by local communities and the two governments. Traditional leaders are central to the adoption and development of the CCs and have been powerful advocates for their establishment. Lately, local-level democratic institutions in the form of these district councils have come to the fore, but at this level are often dominated by opposition parties.

C.1.1. Demography and ethnic composition

The three CCs are sparsely populated with 11 000 households in Inyasemu, 1 294 in Simalaha and 3 390 in Mucheni, with the bulk population being under 15 years. The populations across the

three CCs are largely rural and access land under (customary) communal management. HH sizes vary from 6.6 (Inyasemu), to 6.0 (Simalaha), to 4.2 people per household in Mucheni.

Natural resources management starts at the village level and remains central to the management of the CCs. Across the three CCs, Tonga culture is dominant, but less so in Simalaha CC, where Lozi culture is stronger. In addition, the Toka-Leya culture is found in the Inyasemu CC. Across the three CCs, other tribes have migrated to these areas and are now part of the social rubric.

C.1.2. Health and food security

Malaria remains a major health issue, followed by diarrhoea and malnutrition across the CCs. In the absence of mobile units, health services are hard to access, and it would seem in some instances communities walk or travel long distances to access clinics. As noted in Inyasemu CC access to health services can be affected by poor road networks, especially in areas where roads are impassable in the wet season. However, mobile health services are provided by the government, and mission hospitals to needy people. Across the CCs, the need for childcare and maternity care is critical and at the same time health awareness is needed.

Across the CCs, communities face the perennial problem of accessing clean potable water. Most communities draw water from rivers where the water may not be treated, hence the high incidence of diarrhoea across the CCs. In some cases, the boreholes drilled may produce salty water not suitable for human consumption.

Baseline surveys carried out during the SWM Programme in KaZa showed that high numbers of HHs across the CCs experience some food shortages, especially in the late dry season. Food shortages are severe from September to March, a period which is also characterized by severe malnutrition in children. The severity of food shortages varies by CCs but their regularity is of concern across the CCs, a situation often ameliorated by food relief provided either by the United Nations (UN) or NGOs.

C.1.3. Types of houses and energy sources

Significant differences are noted of the different qualities of housing across the CCs. The dominant structures are houses built with pole and dagga, or mud and fired bricks as well as concrete blocks. Most of the houses are roofed with thatch grass, iron and some "old" houses under asbestos sheets. In the same homesteads, other structures mostly made of wood include granaries and cattle and goat pens. In some cases, the latter must be able to withstand predators where livestock is concerned. The most common source of energy for cooking and space heating for most HHs in the CCs is firewood with a few in Inyasemu and Simalaha using charcoal even though the bulk of that is sold. In addition, most of the households cook on a three-stone open fire with either steel or clay pots. Alternative cooking fuels are severely limited although there is a significant increase in the use of solar equipment for lighting and powering radios and cell phones.

C.1.4. Poverty and livelihoods

Livelihoods across the CCs are provided through arable agriculture and crop sales, livestock rearing, hunting, seasonal (shows limitations) fishing and other small-scale businesses such as grocery shops, as well as trade in poultry. The average size of landholdings per HH varies across the CCs with some having as much as 11 ha and others as little as 3 ha of user rights in the form of communal grazing. Two types of lands are often available to HHs across the CCs: permanent

fields and fallows. Maize is the main crop produced, but production rates, at less than 1 tonne per ha, are considered generally low. Constraints mentioned across the CCs are drought and low rainfall, while access to agro-inputs is of major concern. Consequently, these constraints contribute to the poverty levels in the CCs. As for livestock, the main species reared include: cattle, pigs, goats and chickens, but the lack of water for livestock is also one of the biggest problems facing these areas (Chapoto *et al.*, 2017). This is often exacerbated by the challenge of lack of markets, often causing communities to be cheated by middle marketers, and by distance from feed outlets and veterinary services (see Chapter VII).

C.1.5. Education

Across the CCs, education is far from good. Some schools offer low classes and students have to travel long distances to go to school. Where schools are in place, there seem to be severe shortages of learning materials and books, and in these CCs some students do not have desks. In Simalaha and Inyasemu, community-built schools are in place, but most of these are not well equipped and also do not attract good teachers. Right across the CCs the need to address school infrastructure, including teachers' housing, should be a priority. While the infrastructure for schools is a high priority, most of the HHs in the three CCs pay little regard to girls' education. For most HHs men would probably have gone to secondary school (up to Grade 12 in Zambia), but very few go beyond that. As for women, they often stop at grade 7 and are often married off or are stopped because the HH is constrained with respect to school fees. There are challenges with staffing, as teachers have to travel long distances to schools, resulting in the hiring of untrained teachers in remote schools. The overall school pass rate is very low. In MCC some children attend school irregularly due to food insecurity challenges.

C.1.6. Communication network

The road network across the CCs is bad, with one all-weather road and a series of gravel roads cutting through them. Roads leading to schools and clinics (where available) are generally not well maintained and negatively affect the movement of pupils and patients, as they have to walk long distances to access services. Transporters also do not like to use these roads as their vehicles are often damaged. Mobile telephone communication networks are available in all the three CCs but the key constraint is coverage; though the need to use these facilities exists, the number of users does not commercially justify widespread scaling up of the towers and repeater stations.

C.2. Specific human environment issues

The common and shared human environment characteristics for the three CCs have been presented in the sections above but it is noted that there are some aspects that are peculiar to each CC.

C.2.1. ICC and SCC in Zambia

ICC shares the aspects that have been raised above, but human environment issues differ from others in that human–wildlife issues are intense, and when these are linked to some areas of poaching, the conflict between people and government becomes dramatic. The CC is a product of similar thinking involving four chiefs who view their communities as being severely constrained. They agree that there is widespread poverty notwithstanding the presence of wildlife. They have repeatedly raised issues pertaining to drought and water shortages, low

agricultural productivity and limited development opportunities. The communities have not sustainably exploited the forest and fish resources in a manner that can contribute to poverty reduction due to a combination of factors including lack of markets for products and poor road network. The need to change mindsets is at the top of their thinking so that livelihoods can be improved, for example, through awareness-raising campaigns on sustainable practices that the SWM Programme in KaZa can promote. While the chiefs have taken the mantle for championing development issues, the District Councils are also active and, together with NGOs, have been addressing the same challenges facing the communities.

SCC's human environment is dominated by agricultural activities which are largely low in productivity. Livelihoods are centred on livestock production, dryland cropping and fishing. Due to disease, drought and overfishing, all these three options have contributed very little in attempts to alleviate poverty within the region. There are also human settlements and associated infrastructure but no major industrial activities. The settlement pattern of people in the area shows a strong correlation with linear features such as roads, drainage lines and the relatively richer soils along the edges of floodplains and *dambos* (waterlogged grassland areas) as well as permanent water sources. The two chiefdoms recognize the potential that the CC can provide direct benefits to employment opportunities and nature conservation; especially given that this is a dry area suitable for livestock and wildlife management.

The area is under a traditional land tenure system dominated by the Lozi and Tonga cultures. The communities are currently engaged in a natural resource management programme under the community conservancy concept. The formulation of rules to govern wildlife and fish in the surveyed areas is in the hands of the local traditional leadership: the Village Action Groups (VAGs) report to the headmen/headwomen over the happenings in the community, and only in extreme cases do the headmen/headwomen report to the chief.

C.2.2. MCC in Zimbabwe

A first conservancy in Mucheni was conceived in Ward 4 by Chief Sinansengwe and his people. The idea came after the Chief had realized that wildlife populations were on the decline and that the threat of extinction of some species was imminent. Wildlife populations have been perceived to be on the increase since the establishment of this conservancy in 2016 through a council resolution. The initial conservancy of 7 000 ha in extent is a contiguous piece of land adjacent to Chizarira National Park. The SWM Programme in KaZa plans to support extension (to cover approximately 100 000 ha) of Mucheni Community Conservancy through incorporation of Wards 3 and 5 which are next to Ward 4. With proper land-use planning, the expanded MCC will provide a wider habitat for wild animals as well as important links or wildlife corridors with surrounding protected areas, namely Chete SA, Chizarira NP and Sijarira Forest. Proper land-use planning will also reduce negative interaction between humans/livestock and wildlife. Livestock production (small stock included) as well as irrigated crop production in suitable areas will also improve the livelihoods of people in these dry areas where choices are limited leading to dependence on food handouts. This landscape approach seeks the consent of Chiefs Sinakoma (Ward 3) and Sinampande (Ward 5) and their communities in the other two wards, as well as the consent of Chief Sinansengwe, to work with the neighbours. The process of engagement of the three wards for an expanded MCC is still ongoing, with the District Development Coordinator and Council support expected to facilitate the collaboration. To promote the cohesion of the communities and their traditional and political leaders, the SWM Programme in KaZa made

the choice in each ward: (i) to rehabilitate a social centre with the objective of restoring it to a usable state; and (ii) to install a borehole, both for improving the well-being of the populations and to reduce HWC, as HWC remains a challenge for communities in MCC with carnivores such as hyenas and lions attacking livestock and elephants and birds destroying crops in the fields. It is the intention of the Project to work together with the communities in finding solutions to the conflicts and promoting land use arrangements that reduce contact between people and wild animals, as well as introduce tools such as mobile bomas that would protect livestock from attack by wild animals during the night. The project will also rehabilitate livestock handling facilities, such as dip tanks, and improve access to water as part of a strategy to improve small stock and cattle production in MCC (see Chapter IX).

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IV. INSTITUTIONAL AND NORMATIVE FRAMEWORK

Nqobizitha Ndlovu, Morgan Katati and Davison Gumbo

Introduction

The two models, Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe and Community-Based Natural Resource Management (CBNRM) in Zambia, offer the sustainable utilization of wildlife and other natural resources as a livelihood option for rural communities living in hot and arid regions, which are too marginal for agriculture, such as Binga in Zimbabwe and Kazungula in Zambia.

In Zimbabwe, the early impact of CAMPFIRE began to recede in the early 2000s, due to a weak institutional and legal framework aimed at supporting community participation, decision-making and benefit sharing from wildlife. The lack of clear rights over wildlife for the affected communities, non-recognition of the concept of community conservancies as a wildlife model in the Parks and Wildlife Act, as well as an unclear compensation framework for human–wildlife conflicts, alienated communities from wildlife projects. The SWM Programme in KaZa may go the same way if it follows the same principles of traditional wildlife projects.

Materials and methods

This study focuses on the place of legislation in relation to the power of communities over natural resources, including wildlife. It aims at legally enhancing the role the communities could play in their own management. The authors rely on an in-depth analysis of the history of the countries and the legal texts that govern their laws. Among these texts are the following ones: Constitution of Zimbabwe; Parks and Wildlife Act; Rural District Councils Act; Constitution of Zambia; Statutory Functions Act; Zambia Wildlife Act 2015; National Parks and Wildlife Policy 2018; and National Policy on Environment 2007.

In Zambia, the concept of CBNRM was first promulgated in policy instruments such as the National Conservation Strategy (NCS) of 1985. These early calls for community participation in natural resources management were later transformed into the CBNRM model as has been adopted in the National Environmental Action Plan (1994). This model was mainstreamed into the natural resources and environment sector when the Ministry of Tourism, Environment and Natural Resources (MTENR) was directed to develop the first-ever National Policy on Environment (NPE). This position was later bolstered through the 2011 Environmental Management Act (EMA), through which the minister is tasked with preparing and publishing National Environmental Action plans (NEAPs, Environmental Management Act 2011 Section 21[1]). The objective of such plans is to assess resources at the disposal of the state as a whole, which may be used to take short-, medium- and long-term actions and ensure sustainability in the country. However, the preparation of the NEAPs that promulgate the CBNRM principles has not been consistent across the regions and, as a result, regions such as Mwandi and Kazungula still face constraints in the acceptance of CBNRM.

The major challenges CBNRM faces in Zambia relate to the resource governance as communities do not seem to have autonomy in decision-making over natural resource management, even after registering a Community Resource Board (CRB) as the delegated authority through the Directorate of Department of National Parks and Wildlife. However, as the minister has the power to approve management plans of CRB, suspend them and transfer funds as appropriate, this renders them weak. These CRBs also have inadequate operative texts based on the legal provision, and hence cannot exercise and enjoy freedom of independent decision. In addition, elected CRB members often face elite capture coming from other formal and informal institutions and individuals with clearer roles and mandates that affect their governance structures, especially in the formative stages.

As with Zimbabwe, the early work started in the 1980s with implementation of an administrative management design for game management (ADMADE) programme, intended to involve local communities in wildlife management with a proviso that they would share benefits from wildlife with the state (GRZ, 2004).

Also central to community participation is the notion of community organization, which, as an institution, can be distinguished from a public organization. Essential aspects for this local organization are: (i) it is established by some kind of shared belief and aspiration within communities; (ii) it has what can be likened to a constitution; (iii) it has leadership organs separate from its members; and (iv) the values of the members are based on community action and solidarity.

A. Administration and legal system

A.1. Administrative and territorial organization

A.1.1. Zimbabwe

The administrative system is set out in the Constitution where Chapter 14 details provincial and local government structures. In accordance with the devolution constitutional vision, political power, policymaking decisions, resource raising and distribution, as well as administrative and governance responsibilities, are meant to be devolved through three tiers of government. These include: (i) the national government; (ii) provincial and metropolitan councils; and (iii) local authorities (which include urban councils and rural councils). National government is composed of Ministers who constitute the Cabinet (the executive arm of government). These Cabinet Ministers are directly elected Members of the National Assembly (MPs), Senators or non-constituency Ministers appointed by the President in the terms of the Constitution. The second tier of government – provincial and metropolitan councils – is composed of directly elected and proportional representation of public representatives elected using constitutional provisions contained in Sections 268 and 269 of the Constitution, respectively. The third (and by no means the least) tier of government is that of the local authorities. These are the grassroots-level urban councils and rural councils composed of ward councillors directly elected using constitutional provisions contained in Chapter 14 as read with the Urban Councils Act for urban councils and the Rural District Councils Act for rural councils. In broad terms, rural councils are expected to represent and manage the affairs of people in rural areas within districts into which Zimbabwe's

provinces are divided, while urban councils do the same in urban areas. This potentially provides an avenue for local citizens to access their political representatives, thereby enabling their voices to be heard in decision-making that affects their local service delivery and local development. Zimbabwe is divided into ten provinces including two cities with provincial status – Bulawayo and the capital, Harare – known as metropolitan provinces. The provinces and metropolitan provinces are further divided into 64 districts. Besides the central, provincial and local government structures, the Constitution recognizes traditional institutions. Chapter 15 of the Constitution and the Traditional Leaders Act recognize the role of traditional leaders. Traditional leaders are the custodians of culture and traditions. Their functions include the administration of communal land and the protection of the environment. The Traditional Leaders Act gives the chiefs responsibility within their areas to ensure that the land and its natural resources are used and exploited in terms of the law. This in particular includes controlling cultivation and grazing, and guarding against the exploitation/use of flora and fauna, settlements, and generally preventing the degradation, abuse or misuse of land and natural resources in his/her area. Despite this recognition, principal statutes in the management of wildlife, like the Parks and Wildlife Act, do not make provision for the participation of chiefs in the management of wildlife. The traditional institutions offer a potential institutional framework for the SWM model of community conservancies.

A.1.2. Zambia

Similar provisions are in place with Chapter VIII of the Constitution covering the provincial, district and local entities. The country has 10 provinces and 117 districts for administrative purposes. Each province is headed by a minister appointed by the President, assisted by ministers of the central government whose work is coordinated by a provincial development coordinating committee chaired by a Provincial Minister. A similar structure, the district development coordinating committee, is also present at district level chaired by the District Commissioner. There are five cities, 20 municipal councils and 93 district councils all answerable to the Ministry of Local Government. In addition to these structures, Zambia has a very strong traditional leadership that is present across the provinces and districts, and these leaders are essentially the custodians of culture and traditions. Their functions are not that different from the chiefs in Zimbabwe and include the administration of open lands and natural resources management. The Chiefs Act (1965) gives these leaders responsibility within their areas to ensure that the land and its natural resources are used and exploited in terms of the law. In Zambia, Part XIX of the Constitution, as amended in 2016, recognizes the fundamental importance of people's environmental rights and duties. Here, the rules governing land, environment and natural resources are laid out.

A.2 Legal system

A.2.1. Zimbabwe

The legal system is a plural system that combines the Roman Dutch Law and English Law, imported from the Colony of the Cape of Good Hope on 10 June 1891, with the customary law of the Indigenous Peoples of Zimbabwe. According to the Customary Law and Local Courts Act, customary law means the customary law of the people of Zimbabwe, or of any section or community of such people, before 10 June 1891, as modified and developed since that date.

The same Act defines general law to mean the common law of Zimbabwe (Roman Dutch Law) and any enactment (Statutory Law). Customary Law is mainly applied in civil matters involving personal matters. However, all law, including customary and general law, is subject to compliance with the Constitution of Zimbabwe, which is the Supreme Law. Any law inconsistent with it is invalid to the extent of the inconsistency. With regards to the domestication of international legal instruments and treaties, Zimbabwe ascribes to the dualist tradition. Section 327 of the Constitution directly addresses the application of international law in Zimbabwe. It states that "any international treaty which has been concluded or executed by the President, or under the President's authority, does not bind Zimbabwe unless it has been approved by Parliament and it does not form part of the Law of Zimbabwe unless it has been incorporated into the Law through an Act of Parliament". Further, Section 326 of the Zimbabwean Constitution states that "Customary international law is part of the law of Zimbabwe, unless it is inconsistent with the Constitution or an Act of Parliament".

A.2.2. Zambia

Zambia's legal system is the English "Common Law" System. It enjoys the dualist legal tradition and culture. The predominant legal instrument in Zambia is the Constitution that forms the supreme law of the land; this is followed by Acts of Parliament, statutory instruments and judicial precedents. The Constitution sets out the respective jurisdiction of the republic and legal structures and administrations, including lawmaking process and fundamental principles that govern the relationship between the state and its people. Thus, the Constitution informs the enactment and interpretation of all other laws and can be amended only where two-thirds of the national assembly votes in favour of proposed changes. Constitutional supremacy means that the supreme law of the land and any other law or exercise of power inconsistent with the Constitution is null and void to the extent of its inconsistency (Thomas Mumba vs The People [1984] ZR 38).

National policies are formulated by the Cabinet and constitute a formal legal instrument. National policies contain government vision, rationale, sector objectives and sets of actions required to implement measures aimed at achieving the overall vision (GRZ, 2010). National policies set out as broad objectives thematic areas and mobilization goals in order to guide the formulation of other legal instruments. In Zambia, the development of a legal instrument in any particular thematic area cannot be proposed without a corresponding and overarching national policy and consultations are emphasized to ensure well-coordinated implementation, so that actions are harmonized by all implementers in order to achieve intended results.

B. Legal framework leading to sustainable wildlife management

B.1. Precolonial wildlife tenure

Historically, for both Zambian and Zimbabwean precolonial societies, wildlife was not subject to ownership. As a natural resource, wildlife was considered a community resource. In other words, the wildlife tenure was *res nullius*, whereas wildlife belonged to the people, being central to their sustenance and source of livelihood, and played a key role in the communities' social, cultural and religious well-being. Any member of the community had a right to hunt subject to

a kin-based system of taboos which regulated which animal could be consumed and by whom. Hunting for subsistence was a universal customary right which was open to all members of the community. Since wildlife was considered a source of food, traditional medicine, and religious and cultural ceremonies, the traditional societies coexisted with wildlife. While human–wildlife conflict was inevitable, the utility of wildlife to the communities' lifestyle and well-being was a balance to the loss suffered as a result of human–wildlife conflict.

B.1.1. Zimbabwe

A "community" in precolonial Zimbabwe consisted of a hierarchy of nested land communities and with membership based on acceptance by traditional authority at each level. Common pool resources such as wildlife, grazing, firewood and water were regulated within these structures. In 19th-century Zimbabwe, population densities were low and habitats less fragmented and as such they were not issues of concern. Cousins (1987) states that the land-tenure system functioned as a mechanism of social control. Interventions by the European colonial powers in the 20th century in Africa had a radical impact on traditional land-tenure systems. New nations were established that cross-cut cultural and natural systems. Statutory laws were promulgated that alienated local people from land, grazing, forest and wildlife resources. Rural people lost access to land as protected areas were established, and also lost legal access to wildlife on their own land. The appropriation by the state of natural resources generally led to the emergence of elements of an "open access" system, with individual entrepreneurship invading the commons as a collective sense of proprietorship was lost.

B.1.2. Zambia

Before the British Government colonized Zambia, wildlife was controlled and managed by Indigenous People through chiefs. Under their leadership, wildlife was used for the benefit of the communities and formed an integral part of their lives. With colonization at the turn of the last century, wildlife ceased to be under the custodianship of the Indigenous People, when this was transferred to centralized state protection and management. For this purpose, the Game Ordinance, Chapter 106, was enacted on 1 January 1943, making wildlife the property of the state and governing its use. The subsequent amendments, repeals and replacements of the wildlife legislation were made essentially to keep such wildlife legislation up to date in line with government requirements. Promulgated in 1948, this laid the basis for community loss of control of these resources, to the Northern Rhodesian Government.

B.2. Colonial policies on wildlife tenure

B.2.1. Zimbabwe (1890–1975)

The advent of colonization radically altered this traditional wildlife tenure system. Wildlife, which hitherto had appeared to have no owner until captured or killed and in possession of a person, became the "King's game". The concept of the King's game vested ownership of wildlife within the territory of the Royal Crown in England (Prins *et al.*, 2010). Royal ownership uprooted the traditional system which entrenched harmony between humans and wildlife. The King's game concept marginalized the local communities from a resource, for which they previously had user rights according to the customary law, and this led to widespread public resentment. In

a bid to enforce the monarch's ownership rights over wildlife, excessive penalties were imposed. From this starting point onwards, the lives and liberty of the Indigenous People vanished and they were treated with no respect, as wildlife enjoyed more protection than the local people. The lost utility value of wildlife only served to marginalize and prejudice the people who once held real power over the survival of wildlife on their land.

The racial land tenure system in Zimbabwe further exacerbated the breakdown in human–wildlife relations. While under the traditional setting the *igusu* (wilderness/forest) was reserved for wildlife, the colonial government appropriated local communities' land and forcibly displaced the local communities to *emaguswini* (wilderness/forest areas). The colonial land use system totally disregarded the buffer zones which separated from *imizi* (human settlements) during precolonial times. The inevitable conflict between wildlife and humans was thus born. The King's game concept which effectively stripped the local communities' use rights through hunting only served to fuel the conflict. The excessive penalties against hunting or killing of wildlife also reinforced the feeling that the colonial government valued wildlife more than human life. Wildlife thus lost its community utility and instead began to be viewed as a symbol of colonial domination and mastery. The desire to preserve hunting for the white minority and ruling elites as well as preserving iconic species (e.g. "big five" species) became paramount over the rights of local communities.

B.2.2. Zambia (1890–1964)

The history and development of wildlife in Zambia can be linked to a 1912 private conference in London, which called for an extension of the "gun frontier" on Africa's game. The conference listed animals deserving of protection and proposed the establishment of game reserves. In 1931, Captain Charles Pitman was seconded to Northern Rhodesia for a two-year period to carry out a faunal survey and, among other things, recommended a site for the country's first national park. Thereafter, Zambia prepared a "Memorandum on policy concerning the foundation of a game department and conservation of fauna in Northern Rhodesia". The memorandum paved the way for the establishment of the Department of Game and Tsetse Control in February 1940, and later on, in 1943, the enactment of the Game Ordinance, Chapter 106 of the Laws of Northern Rhodesia by the Northern Rhodesia Government.

The earliest recorded piece of legislation relating to wildlife conservation in Zambia was enacted 100 years ago when the Ostrich Export Prohibition, Chapter 115 of the Laws, came into force on 16 March 1912. Later on, the Plumage Birds Protection, Chapter 203 of the Laws, came into force on 27 November 1915. In 1941 Ordinance number 41 was enacted but this was later replaced by the Game Ordinance, Chapter 106 of the Laws, on 1 January 1943.

Part 11, Section 3 of the Game Ordinance had a provision for establishing a national park. It stated that the Governor, by proclamation with the consent of the Legislative Council signified by resolution, may declare any area of land to be a national park and may, in like manner, define or alter the limits of any such areas. It was during this time that the Governor evoked powers vested in him under Section 3 of CAP 106 to declare Kafue National Park under Government Notice 108 of 1950. Chapter 106 of 1943 made no mention of game areas until 1954 when the Fauna Conservation Ordinance No. 43 was enacted which provided for the declaration of four additional game areas. Throughout these early phases of developing wild policy as a nation, communities remained on the periphery of the conceptualization and implementation of the

proposed strategies and, as a consequence, there was limited uptake and participation at the local community level, and hence low impact. Lately, there have been some relevant policies and laws that govern the environment and natural resources sector, wildlife included, but these instruments are not clear on the modalities of community engagement. This has resulted in superficial implementation of the instruments and further alienation of communities in this sector.

B.3. Wildlife tenure

B.3.1 Zimbabwe (from 1975 to Present)

Wildlife is regulated by the Parks and Wildlife Act. The Act does not make a specific provision on the ownership of wildlife (ownership in its classical sense meaning the state or fact of exclusive rights and control over property). Rather, the Act bases wildlife tenure on custodianship or possessory rights. The difference between ownership and possession lies in the fact that ownership involves the absolute rights and legitimate claim to an object whereas possession is more the physical control of an object. The possessor has a better claim to the title of the object than anyone, except the owner himself/herself. Possessory rights are lost with loss of control while ownership rights survive the loss of control.

The overarching principle of wildlife tenure in Zimbabwe is that wildlife is *res nullius* (meaning it is not capable of private ownership and the rights therein are free to be acquired by means of occupation, that is, possession). Based on the *res nullius* principle, the Parks and Wildlife Act imposes duties on the Parks and Wildlife Management Authority to conserve wildlife on state land through the establishment of Parks and Wildlife Estate, while also conferring privileges on owners or occupiers of alienated land as custodians of wildlife, fish and plants.

Zimbabwe's Wildlife Act introduced the concept of appropriate authority (AA) to regulate wildlife tenure. The AA provides for possession, management and benefit from the wildlife as long as the wildlife is on the land of the landholder. This has led broadly to three types of wildlife tenure systems through the AA status:

- The first category is State ownership. The State owns the wildlife in the Parks and Wildlife Estate and other state land other than forest land through the grant of AA status to the Parks and Wildlife Management Authority. This also applies to ownership of wildlife in forest land through the grant of AA status to the Forestry Commission.
- The second form of wildlife tenure is freehold. Freehold landholders have the AA for wildlife under their land. Freehold landholders are characterized by individual landholdings. Hence, they have strong property rights over wildlife and stand to benefit fully from their wildlife management efforts.
- The last category is community wildlife tenure. The Rural District Councils can be appointed as AAs on communal land by the Minister of Environment to manage wildlife on behalf of the community. However, the community benefit sharing mechanisms have not been provided for in any statute. The tenure system relating to fishing also mirrors the wildlife tenure system in following the AA status concept. The Minister of Environment can declare any person to be the AA over any waters. If no person has been specified in a notice made by the Minister as the AA for such waters, the AA for the land riparian to such waters is the AA. There is thus a strong link between land tenure, wildlife tenure and water tenure.

B.3.2. Zambia (from 1964 to Present)

In 1964, the Republic of Zambia became an independent state and immediately repealed and replaced the two Ordinances with the National Parks and Wildlife Act Chapter 316 of 1968, which became operational in 1971. Twenty-three years later, the National Parks and Wildlife Act was repealed and replaced by the National Parks and Wildlife Act No. 10 of 1991. In 1998, the National Parks and Wildlife Act No. 10 of 1991 was repealed and replaced by the Zambia Wildlife Act No. 12 of 1998. Zambia's wildlife legislation has been repealed and replaced at least three times since the inception of the wildlife institution. Act No. 12 of 1998 was repealed and replaced by the Zambia Wildlife Act No. 14 of 2015. Further, the Wildlife Act of 2015 upheld most of these aspects. Of critical importance to the SWM Programme in KaZa, the present Zambia Wildlife Act of 2015 provides for the establishment, control and management of national parks, bird and wildlife sanctuaries and for the conservation and enhancement of wildlife ecosystems, biological diversity and objects of aesthetic, prehistoric, historical, geological, archaeological and scientific interest in national parks. In addition, it provides for the promotion of opportunities for the equitable and sustainable use of the special qualities of public wildlife estates and further provides for the establishment, control and co-management of Community Partnership Parks (CPPs) for the conservation and restoration of ecological structures for non-consumptive forms of recreation and environmental education. The same act provides for the sustainable use of wildlife and the effective management of the wildlife habitat in game management areas (GMAs) and sets the stage for communities to participate in the management of these areas. It will also provide for the additional categories of protected areas to permit active participation of the private sector, consolidate the latest gains made in CBNRM and manage the impact of global climate on wildlife.

Wildlife management in Zambia is controlled by the "Zambia Wildlife Act [No14]" Section 5(2) which establishes national parks, Community Partnership Park (CPP), bird and wildlife sanctuaries, and GMAs. Management principle for these areas is underpinned by the balance between sustainable use of wildlife and the management of ecosystems. As indicated above, the Zambia Wildlife Act provides rights to the local communities for managing GMAs. Further, Section 12 gives the following provisions for the establishment and management of CPP through five sub-sections: (1) the Minister may, on the application of a local community, a person, institution or organization, declare, by statutory instrument, an area that has an environmental, ecological or scientific value or significance to be a CPP for environmental education and recreation or for the purpose of conserving, preserving and restoring genes, species or biological diversity and natural amenities and their underlying ecological structure, and may, in like manner, declare that such an area shall cease to be a CPP or that the boundaries of a CPP shall be altered or extended. (2) A person, local community, institution or organization may apply to the Committee, in the prescribed manner and form, to enter into a partnership agreement with the Department in respect of a CPP. (3) The Committee shall, in determining an application made under sub-section (2), consider the current and potential uses of the area and the capacity of the applicant to ensure sustainable wildlife conservation and management. (4) The Minister may, by statutory instrument: (a) designate an area in respect of which a partnership agreement is concluded; (b) prescribe the rights and obligations of the parties to partnership agreements; (c) prescribe the content, terms and conditions of partnership agreements; and (d) provide for the assignment, amendment and termination of partnership agreements. (5) A party to a partnership agreement shall (a) protect, conserve and manage the CPP in respect of which it is

made pursuant to the partnership agreement and the general management plan for the CPP; (b) administer the traditional user rights of the local community in accordance with sustainable wildlife management and conservation; (c) in consultation with the relevant authority, protect objects of aesthetic, prehistoric geological, archaeological and scientific interest in the CPP; (d) assist the Director in enforcing the provisions of this Act in relation to illegal wildlife harvesting and trafficking; (e) with the written approval of the Director, enter into partnerships with other persons for the purposes of ensuring efficient and sustainable wildlife conservation and management; (f) keep the Director informed of any development, change and occurrence within the CPP that is critical for the conservation of biological diversity; (g) help in firefighting within and around the CPP; and (h) do any other thing that is necessary for the efficient conservation and management of the CPP.

Under Section 28 (1), the President may, after consultation with the Minister and local community, by statutory order, declare an area of land within the Republic of Zambia to be a GMA for the sustainable utilization of wildlife and for the purpose of this Act and may, in like manner, define or alter or extend the limits of the area or order the area to cease to be a GMA.

The provisions for the involvement of the communities in the management of human and natural resources in a Community Partnership Park, Game Management Area or an open area falling under its jurisdiction are given in Sections 32 and 33. Section 32 states that a local community along geographic boundaries contiguous to a chiefdom in a GMA, an open area or a particular chiefdom with common interest in the wildlife and natural resources in that area, may apply to the Minister for registration as a Community Resources Board. Section 33 (2) provides that "Without prejudice to the generality of subsection (1), a board may: (a) negotiate, in conjunction with the Department, co-management agreements with hunting and outfitters and photographic tour operators; (b) manage the wildlife under its jurisdiction using quotas specified by the Department; (c) appoint community scouts to exercise and perform the duties of a wildlife police officer under the supervision of a Wildlife Police Officer falling under the Board's jurisdiction; (d) in consultation with the Director, develop and implement management plans which reconcile the various uses of land in areas falling under the board's jurisdiction; and (e) perform such other functions as the Minister or the Director may direct or delegate to it".

The Zambia Wildlife (Community Resource Board Revenue) Regulations [No. 89] 2004, Regulation 3, states that "The Authority shall pay into a fund established by the Community Resource Board fifty per centum of the total revenue earned by the Authority from animal licence fees".

B.4. Hunting, fishing and ecotourism

B.4.1. Status of hunters/fishers and ecotourism operators

B.4.1.1. Zimbabwe

The AA regulates the status of hunters and fishers in Zimbabwe. The Parks and Wildlife Management has the overall control over hunting in Zimbabwe, exercised through a hunting and fishing quota system. However, the Parks and Wildlife Act grants hunting and fishing rights through the AA status concept. AAs are given privileges of custodianship over the wildlife and fish in their land under the terms of the Act. The custodianship privileges give the AA rights of use and benefit from the wildlife and fish found in their land. These include hunting and fishing

rights. As such, under the terms of the Act, private landowners are the AAs over wildlife and fish found within their land. They are recognized by the law as holding hunting rights over wildlife and fish within their land boundaries. The same applies with the Forestry Commission which is the AA in respect of forest land, and Rural District Councils which are AAs over communal land. While the Parks and Wildlife Management Authority is the AA over the Parks and Estate, which includes national parks, sanctuaries and safari areas, the Act prohibits hunting in national parks. As such, the Authority exercises its hunting rights mainly in safari areas. By virtue of their status, the AA holders can hunt on their land and/or fish in the waters without needing a specific permit/licence. They also have the authority to give hunting/fishing permits within the areas under their control. The Act also recognizes professional hunters, learner professional hunters and professional guides. No person shall conduct for reward: (i) any hunting safari on any land; or (ii) any photographic or viewing safari either on foot or on horseback, unless he/she is the holder of a professional hunter's licence, learner professional hunter's licence or professional guide's licence authorizing such conduct. The Authority, with the concurrence of the Minister, issues professional hunter's licences, learner professional hunter's licences or professional guide's licences to any person whom it deems fit. It is the duty of the professional hunter to supervise and control the hunting by every person who hunts during safaris conducted by him/her in terms of his/her licence.

B.4.1.2. Zambia

Zambia's national policy on environment espouses an integrated management of the sector but recognizes intrasectoral differences. Several pieces of legislation and policy documents provide for one form or another of co-management and grant some rights for natural resource management to the local community (Mukosha and Siampala, 2009). Central to this discussion are the three subsectors within the environmental and natural resources, which include wildlife, fisheries and forests that over time have developed CBNRM structures such as CRBs, forest management committees (Forest MC) and fisheries management committees (Fisheries MC). These pieces of legislation define the rights and rules of access to each resource. Access to wildlife is restricted, and there is no hunting at that level, as are any benefits in the form of protein as provided through trophy hunters. In the fisheries subsector, access to fish is largely open in open or customary lands but restricted under game management areas and national parks. The law is unclear in forestry reserves. In areas where fisheries management committees are in place they make decisions vis-à-vis who carries out the fishing and they should have permits to carry that out. In forestry, access to livelihood needs is open unless one is harvesting for commercial purposes, such as charcoal. In such cases permits are required.

B.4.2. Licensing system for hunting/fishing (subsistence, commercial, sport) and ecotourism

Hunting in Zimbabwe, as in Zambia, is guided by a permit system based on availability of game numbers. Such permits are issued by the Minister responsible for the Zambia Wildlife Act. There have been cycles of banning and unbanning hunting in Zambia due to perceived malpractices (Chomba and Nyirenda, 2013). In such times, the CRBs found in GMAs with hunting blocks were affected as no funding would be available, thereby affecting their revenues. Zambia legislation is very clear about fishing and forestry where permits for any commercial venture are required and issued by the relevant government departments upon recommendations of the traditional leaders.

B.4.2.1. Zimbabwe

The Zimbabwean Parks and Wildlife Act uses and recognizes the term "permit" to refer to the right given by an AA to hunt/fish, while the term "licence" is used to refer to professional licences (professional hunter, learner professional hunter, or professional guide, authorizing holders to undertake safari hunting or safari viewing).

The Parks and Wildlife (General) Regulations identify the following types of permits: (i) fishing; (ii) hunting; and (iii) general permits, without classifying them according to usage (that is, subsistence, commercial, sport, scientific or research). The Regulations do not clarify what is the purpose for general permits. A further classification is provided by the Parks and Wildlife Management Authority (Tariff of Fees) By-laws, 2019, which identify two broad types of permits. These are the hunting and fishing permits. These two categories are further categorized according to usage.

Under fishing permits, the By-laws differentiate between an ordinary permit and commercial permit for cray fishing. The ordinary permit for cray fishing is USD 5 per day for three nets and USD 100 for 50 cages per month for the commercial permit. It further identifies subsistence fishing by resident communities (USD 1 for a maximum volume of fish to be determined by the AA responsible for the water body for rod and line fishing). Another classification is gillnet/ commercial fishing. The minimum annual permit fees vary per each water body. In private dams it is USD 50 per annum.

Under the hunting permit category, differentiation is made between ordinary hunting permits and special hunting permits for dangerous game, special hunting permits for plain game, special permits for bow hunting and special permits for using dogs, as well as special permits for backpacker hunting. While the Act recognizes various reasons for undertaking hunting, it does not recognize subsistence hunting by local communities. As a result, hunting communities are required by law to apply for hunting permits. The general costs of the various permits are as follows: USD 50 for hunting permits; USD 1 500 for special hunting permits for dangerous game, including the use of bows, arrows and handguns; USD 100 for special hunting permits for plain game, including the use of bows, arrows and handguns; USD 1 500 per pack of 12 dogs, or special hunting permit using dogs and USD 300 for backpacker hunting. The By-laws further recognize Professional Guides' Licences which are USD 100 per annum, Professional Hunters' Licences which are USD 200 per annum and Learners' Hunter Licences at USD 50 per annum. The permits are issued by the respective AAs. However, hunting of specially protected animals on any land is an exception which needs to be approved by the Parks and Wildlife Management Authority and the Minister through a specific permit.

A permit issued in terms of the Parks and Wildlife Act gives the holder hunting/fishing rights. The specific duties and obligations of the holder of the permit are specified in the conditions of the given permit. With the exception of a fishing permit issued by an AA for any person or class of persons to fish in its waters, every permit must be in writing. The AA may at any time without giving any reason refuse to grant or issue any authority, permit or licence or cancel or amend any authority, permit or licence. However, in instances where the AA cancels or amends any licence/ permit/authority, it must give notice to the licence holder who then has an obligation to return the licence/permit for endorsement of the amendment or cancellation. It is an offence to refuse or neglect to return the permit/licence after receiving the cancellation or amendment notice.

It is also an offence to make any material alteration to the permit/licence. Any person who is aggrieved by the decision of the AA in any unalienated land regarding the issue, cancellation or amendment of a permit shall appeal to the Minister. The permit/licence for hunting and fishing is non-transferable.

B.4.2.2. Zambia

Game hunting in Zambia is regulated by:

(i) The National Parks and Wildlife (Game Animals) Order [No. 41] of 2016, Regulation 3: A person shall not hunt a game animal of the species listed in the Schedule, except in accordance with a licence issued under the Act;
(ii) The Zambia Wildlife (Licences and Fees) Regulations [No. 46] 2003, Regulation 2(1): Application for non-resident hunting licence shall be made in Form 1 as set out in the First Schedule;
(iii) The National Parks and Wildlife (Methods of Hunting) (Restrictions) Regulations [No. 63] 1993, Regulation 2: A person shall not use a firearm for, or in connection with, the hunting of any game or protected animal specified in the First Schedule other than a firearm specified in the First Schedule in relation to such game or protected animal;
(iv) The National Parks and Wildlife (Birds Sanctuaries) Regulations [No. 64] 1993:

- Regulation 3: Any person who normally resides or intends to reside in an area covered by a bird sanctuary may apply to the Director for a residence permit. [...] (3) A residence permit shall be free of charge, but may be issued subject to conditions as the Director may endorse thereon.
- Regulation 5: A person, other than a police officer, a wildlife ranger, an honorary police officer, or other public officer performing his functions under this Act or any other written law, shall not enter a bird sanctuary or remain or reside therein without an appropriate permit issued under this regulation.
- Regulation 7: Without written permission of the Minister, a person shall not engage in trade or business within a bird sanctuary.
- Regulation 8: In any area covered by a bird sanctuary, a person, without the written permission of the Director or without the appropriate permit or without just cause or excuse, shall not: (a) hunt or disturb any wild animal, fish, bird or bird nest; (b) cut, deface, damage, destroy or remove any vegetation; (c) remove from such area any wild animal, whether dead or alive or any trophy thereof.

(v) The National Parks Regulation [No. 88] 1993, Regulation 17 which prohibits a person without the written approval of the Director, to remove any wild animal, whether dead or alive, or trophy, vegetation or any object of prehistoric, archaeological, historical or scientific interest from a national park or from any part of the national park;
(vi) The National Parks and Wildlife (Elephants and Rhinoceros) Regulations [No. 81] 19930101, Regulation 2: The hunting of elephants and rhinos is, with immediate effect, prohibited throughout Zambia.

B.4.3. Hunting/fishing seasons and methods

B.4.3.1. Zimbabwe

The Zimbabwean statutory framework does not make specific provision for hunting and fishing seasons as these activities are regulated through terms and conditions under permit issued under the Parks and Wildlife Management Authority. The regulations explicitly prohibit night-time hunting within the Parks and Wildlife Estate which includes national parks, sanctuaries, botanical reserves, safari areas and recreational parks which fall under the Authority. This prohibition does not apply in communal and privately-owned lands.

In Zimbabwe, the Parks and Wildlife Act, Parks and Wildlife General Regulations and the Trapping of Animals (Control) Act regulate hunting and fishing methods as well as hunting and fishing tools. The Act prohibits fishing using explosives, firearms, chemicals, jigs and electrical devices. The Parks and Wildlife General Regulations also provide that no person shall, in any waters, use any fishing gear other than a rod and line or hand line to which: (a) not more than three single hooks or trout-flies are attached; or (b) not more than one conventional lure having not more than three single or three double or three treble hooks is attached. Unlike fishing, the Act itself does not specify the prohibited hunting methods and tools for wildlife, but these are found in the Parks and Wildlife Regulations which only regulate hunting in the Parks and Wildlife Estate. The following hunting methods and tools are prohibited: (i) the use of any equipment to transmit sound as a lure to attract animals in the Estate for the purpose of hunting the animals; (ii) offering any food to any animal within the Estate; (iii) the use of fire as a means of driving or surrounding any animal; (iv) the use of aircraft; (v) hunting within the Parks and Wildlife Estate; and (vi) hunting any animal by night or use of any dazzling light for the purpose of hunting. Further, the Regulations prohibit the shooting of animals within 400 m of a prescribed road or development area or watering hole. It is also prohibited in the Parks and Wildlife Estate to discharge any weapon at or towards any animal while in a motor vehicle, vessel or aircraft or to use any motor vehicle, vessel or aircraft in such a manner as to drive, stampede or disturb any animal for any purpose whatsoever. There are also restrictions on the use of hunting weapons. The Regulations prohibit the use of a rifle or shotgun capable of firing more than one cartridge per trigger and the use of a weapon with a barrel less than 500 mm in length.

While the use of a bow and arrow was previously prohibited in some places other than communal land, in 1999 Zimbabwe introduced additional restrictions on this weapon. It amended the Regulations and restricted bow hunting to "alienated land". This includes private land, state land held under the terms of an agreement of purchase or lease, or trust land held under the terms of an agreement of lease. The amendments also imposed an absolute prohibition on the use of the following: (i) any type of crossbow; (ii) an arrow to which any drug or chemical has been applied to incapacitate or kill animals; (iii) an arrow to which an arrowhead capable of exploding in any way has been attached; and (iv) any broadhead other than a permitted broadhead.

B.4.3.2. Zambia

Hunting in Zambia is by permit which is issued by the Minister responsible for wildlife. Hunting is strictly limited to hunting blocks or as part of problem animal control. In open lands, i.e. customary lands, a permit to hunt is required even in designated hunting areas such as GMAs. In terms of fisheries, closed seasons and licences are in place and they are meant to limit the

number of fish harvested so as to prevent the depletion of fish resources. In addition, the same regulations protect young specimens whose loss can eventually lead to the extinction of a given species. An emphasis is also put on minimum mesh sizes of fishing nets and the admissible width of apertures in fishing traps and baskets. These clauses are aimed at preventing the harvesting of fingerlings.

In Zambia, hunting guns are regulated under the National Parks and Wildlife (Methods of Hunting) (Restrictions) Regulations [No. 63] 1993, specifically, Regulation 2: "A person shall not use a firearm for, or in connection with, the hunting of any game or protected animal specified in the First Schedule other than a firearm specified in the First Schedule in relation to such game or protected animal". Methods of hunting refer to Section 33 of the Game Ordinance of 1941 which specified that no person shall drive, stampede or unduly disturb any animal when hunting. Additional regulations have been provided since then and today hunting is controlled through national regulations and as well by the Zambian professional hunters' own code of conduct. Failure to adhere to these simple laws can result in the termination of a safari and confiscation of trophies. For example, pre-baiting, shooting from a vehicle, and shooting at night are strictly prohibited. The hunting season runs from June to November.

B.5. Human–wildlife conflict

In Zimbabwe, human–wildlife conflict (HWC) is limited to the control of problem animals that are likely to harm either human lives or property. The Parks and Wildlife Act provides for the right to self-defence in response to wildlife attacks. The burden of establishing this defence lies with the party that is raising it. According to the Parks and Wildlife (General) Regulations, an animal may be killed in defence of any person without a permit. The burden of proof lies with the person killing the animal. It is mandatory for one who kills an animal in self-defence or defence of another person to report such action in person within seven days of the act. The report should be made to the appropriate authority of the jurisdiction within which the action occurred, or where the animal was last sighted or at the nearest convenient office of the authority or police station or at the office of the local authority for the area concerned.

The Act does not allow a person to kill an animal in defence of his/her property. Rather, it provides for the control of problem animals through killing of wild animals within a national park which are causing damage to property. The AA is the one which has the power to kill such animals, in this case the Parks and Wildlife Management Authority. The Act provides that in alienated land, the Minister, in consultation with the Environment Committees, after giving an opportunity for the AA to participate and to make representation in relation to any suggested proposal insofar as it relates to problem animal control, may authorize the reduction of problem animals which are causing excessive damage. Within communal areas, HWC is managed under problem animal control (PAC) which is the responsibility of the Rural District Council (RDC). Local communities report incidences of HWC to the RDC. The RDC responds to community distress calls by sending a reaction team to the site. In practice this may not be smooth as districts have large areas and it may take time before the reaction team gets to the site. Further, the RDC may be limited by resources. This is a big source of frustration for the communities of Wards 3, 4 and 5 in Binga which constitute the Mucheni Community Conservancy, as the legal framework does not make provision for compensation for HWC damage and death.

In Zambia, as elsewhere, human populations interact with wildlife in numerous ways. Humans have greatly modified habitats and landscapes through various land uses, such as village settlements, cultivation and other extractive industries with far-reaching and typically negative impacts on wildlife populations. Human–wildlife conflict is a face-off between people and wildlife over space or resources. Typically, conflict involves wildlife that consumes pasture or crops or attacks domestic stock or even humans who kill wildlife in reprisal (Woodroffe *et al.*, 2005). The problem has been more noticeable in areas surrounding or adjacent to GMAs (Astle, 1999). The GMAs were established on land that was previously used for subsistence cropping or grazing by local inhabitants. The principal objective was to prevent disruptive land use practices while conserving wildlife within these areas at optimum variety and abundance commensurate with other land uses (Matenga, 2002). There are a number of measures that can help to minimize the risk of conflict arising between people and animals. They include: removing either the people or the animals, physically separating the two by use of barriers, managing by a variety of means the numbers of animals to reduce the risk of conflict, and employing a variety of scaring and repelling tactics. To date, reports have been received from both Inyasemu and Simalaha of HWC incidents caused by people encroaching into wildlife habitat. Local responses have been limited and responses are from the Department of Parks and Wildlife but the establishment of the CRBs as well as the CC Management Unit should seek better coordination.

B.6. The community conservancy model and community participation in the SWM Programme in KaZa

The concept of local resource management (LRM) has gained traction in the SWM Programme in KaZa (Kamphorst *et al.*, 1997). Instead of a top-down approach to management, LRM involves local people in the management of natural resources. The CAMPFIRE programme in Zimbabwe is an example of an LRM-based project, in which active participation of local people is the central theme. This project is based on utilization of wildlife resources and management by communities living with wildlife. The goal is to reach effective participation of local people which intends to involve them in the design and implementation of wildlife projects, so that these projects will reflect people's needs more accurately. The Parks and Wildlife Act, particularly Section 108 which provides for the appointment of a Rural District Council to be the AA for such areas of communal land, forms the legal basis of CAMPFIRE. The Rural District Councils, as the AAs over communal land, have custodianship rights over wildlife. While the philosophical backing of CAMPFIRE is that the RDCs manage the wildlife on behalf of the communities, the Parks and Wildlife Act is silent on this aspect. As such, in terms of the Parks and Wildlife Act, communities have no custodial rights over wildlife in communal areas. This effectively hinders effective community participation in wildlife management and benefit sharing. According to the International Institute for Environment and Development (IIED) three broad principles should be fulfilled in order to achieve effective participation of communities with regard to the conservation of wildlife (IIED, 1994).

These include: (i) recognition of local community rights to ownership of wildlife resources; (ii) building on formal and informal structures that facilitate community participation in wildlife management; and (iii) operation of effective mechanisms for the sharing of benefits of wildlife resources with communities. Under CAMPFIRE, the implementation of these principles turned out to be somewhat disappointing (Kamphorst *et al.*, 1997). First, the producer communities

are restricted to the role of producers, instead of having become owners of wildlife resources. Second, participation of communities is mainly restricted to the SWM Programme in KaZa implementation and excluded from revenue sharing. Finally, benefits to the communities arising from the management of wildlife are lower than the costs of human–wildlife conflict. The lack of community participation resulted in the idea of the creation of Mucheni Community Conservancy to effectively involve communities in the SWM Programme in KaZa.

However, there is no legal provision which recognizes the establishment of community conservancies in both Zambia and Zimbabwe. The Parks and Wildlife Act of Zimbabwe only recognizes the establishment of national parks, botanical reserves, botanical gardens, sanctuaries, safari areas and recreational parks, while the Zambia Wildlife Act of 2015 established national parks, community partnership parks, bird and wildlife sanctuaries and GMAs. As such, there is no legal framework for the establishment of community conservancies. However, the concept of conservancy in Zambia only features in the National Parks and Wildlife Policy of 2018, making it a political pronouncement with no legal backing.

In reality, Mucheni Community Conservancy is an extension of the CAMPFIRE concept. The RDC remains the AA over the conservancy. The land belongs to the RDC in terms of the Rural District Councils Act. The benefit sharing mechanism is not provided for in terms of the law. As such, there is no legal instrument making provision for the establishment of community conservancies or community participation in the SWM Programme in KaZa. While there is no statutory provision for the establishment of community conservancies, there are several models which have been used in Zimbabwe to constitute community conservancies. The commonly used model is the trust model. This model involves the organization and registration of the community as a trust. This gives the community legal recognition and standing. Once a community has been organized and registered as a trust, it can then enter into direct contracts with safari operators and be allocated hunting quotas directly by the Parks Authority. This gives the community direct control of the wildlife resources and effective participation on the sharing and use of the resources. It is envisaged that this model be adopted for Mucheni Conservancy. Another model to explore is the cooperative company (Chinhoyi, 2004). According to the Chapter 24:03 Companies Act of Zimbabwe,[1] a CC as a community-based organization (CBO) can be established as a cooperative company whereby no one member is able to acquire majority of the shares and take control of the company. There is no limit or restriction to the total number of members with an equitable voting right for all members. Profits made by the company can be returned to the members out of untaxed income.

There are three routes through which community conservancies can be established in Zambia. The first is through the mechanisms of CRB under the Zambia Wildlife Act of 2015. A CRB is enshrined in the Zambia Wildlife Act which provides for the formation of a board to manage and protect natural resources, especially on traditional or customary land adjacent to protected areas such as national parks and game management areas. CRBs comprise democratically-elected leaders to serve for a fixed period of time (usually three years). The committee of elected CRB members safeguards all natural resources and collects revenues from such resources; 50 percent remains in the area for operations while the other 50 percent is retained by the central government. A conservancy formed under CRB policy and principals operates normally like other CRBs in other areas except many of the management decisions are influenced by the programme/funding stakeholders.

[1] https://www.zse.co.zw/wp-content/uploads/2019/03/COMPANIES-ACT-CHAPTER-24-03-3.pdf

The second approach could be through a public private partnership agreement (PPPA) which allows for the formation of a conservation on traditional or customary land by private investors entering into an MoU with the custodians of such land. This arrangement allows for 100 percent retention of revenues or proceeds raised from such a conservancy. Decisions regarding management are driven by both the investor and the local communities while using guiding principles from the government. The aforementioned type of conservancy is widely liked by communities because they feel free to utilize financial resources according to the needs of their communities. Members leading this type of conservancy are democratically elected by their community members to represent them.

The third route is through the Zambia Forest Act of 2015, where a community can carve an area and designate it as a community conservancy through an application to the Forestry Department. In this way, all resources found there including wildlife would be part of such a CC. The land so set aside will need rules as well as a community agreement and constitutions to be run in that manner.

In Zambia, there are two conservancies, Inyasemu and Simalaha, which consider some principles to the establishment of participation of communities in resources management in the areas under their jurisdiction. Chief among these are community ownership, benefits accruing to communities, and the involvement in management. In this way, problems emanating from human–wildlife interactions can be resolved at that level as espoused in the 2015 Wildlife Act, which suggests that the benefits of game management areas should be given to local communities, and extols the involvement of local communities in the management of GMAs. The Act points to the enduring premise that wildlife conservation is best achieved through community participation and benefits (GRZ, 2004). In the case of the two Zambian community conservancies, the legal basis of their formation lies in local-level agreements among four chiefs, viz. Senior Chief Inyambo Yeta, Chieftainess Sekute, and Chiefs Nyawa and Musokotwane, who in this case will establish two separate trusts that will run the conservancies on behalf of the communities. In either case the trust to run such community conservancies can either act as separate entities but working in close collaboration with the Department of Parks and Wildlife or as separate entities with no formal link with the state structures except in following the state's rules of wildlife management. Simalaha already has a working trust and works closely with the national parks in Zambia. Inyasemu is still exploring its identity and, at present, an MoU among the four chiefs is being finalized, the idea being to set up a trust as in Simalaha. The choice is to either establish the conservancy under the Parks and Wildlife Act (under the provision of CRB formation) or as a stand-alone entity but affiliated to a national park.

C. Conclusion and recommendations

One common thread in the wildlife management system from colonial times to the present is the lack of legal clarity over the role of local communities in the management of wildlife. As noted in the CBNRM review funded by the European Union, the CBNRM-related laws do not have a formula on the sharing of revenue with local communities, yet they are the ones who bear the brunt of human–wildlife conflicts. Further, despite their role in preserving culture, traditions, history and heritage of communities as well as management of the environment, the traditional leaders do not have decision-making powers over natural resources management. There are no

built-in accountability mechanisms for boards to represent the views, needs and interests of the local communities in all CBNRM-related laws including the Parks and Wildlife Act. There is thus a need to strike a balance between ownership and utilization and communities play a critical role in this balance. In this regard, the permitting and quota setting systems must involve the local communities. If the local communities do not see the utility of wildlife, then conservation efforts will in the long term be for naught.

In Zambia, a CC can be forged under sector-specific natural resource legislation for purposes of co-management, but the formation, membership, objectives, functions and mechanisms for benefit sharing must be prescribed in the legislation which also regulates them. The present ambiguities in the legislation vis-à-vis what power people and communities have over their resources must be spelled out.

The following recommendations, informed among others by the governments of Zimbabwe and Zambia, and CBNRM and CAMPFIRE review reports, specifically relate to the SWM Programme community conservancy model. The Parks and Wildlife Act and the Zambia Wildlife Act No. 14 of 2015 must be reviewed to make provision for the following issues as linked to the various devolution expectations in both countries:

- community rights including provisions for meaningful access and devolution, community participation and governance;
- establishment and regulation of community conservancies;
- conferment and regulation of AA and user rights to community-based organizations at subdistrict level, Zimbabwe in particular, Zambia to investigate;
- access and benefit sharing (royalties, financial and non-financial);
- Formulation of a framework for sharing benefits and Zimbabwe could take a lead from Zambia;
- prior informed consent of communities (Material Transfer Agreement [MTAs]);
- beneficiation of products;
- human–wildlife conflict (HWC) mitigation and compensation framework;
- creation of a platform for community concerns to be submitted and considered in relation to CBNRM policy at national and regional level as well as within the context of transfrontier
- conservation areas (TFCAs); and
- development of a mechanism for effective coordination and periodic review of CBNRM issues.

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Summary

This chapter presents key results of the Sustainable Wildlife Management (SWM) Programme in KaZa and also looks into the future of hunting in three new community conservancies (CCs), i.e. Inyasemu and Simalaha in Zambia, and Mucheni in Zimbabwe. The chapter is based on data collected during wildlife surveys, reviews of various literature sources and consultations with different key stakeholders of the concerned landscape. Wildlife populations in the three CCs are generally low but have been steadily increasing in Simalaha CC after the translocation of some wildlife species into the area. The current challenges facing wildlife management in these CCs include competition for habitat resources and the harsh realities of managing wildlife both as an enterprise and as a source of food for rural communities, among others. The development of robust management plans, effective wildlife monitoring protocols, and alternative sources of protein are some of the important pathways that the SWM Programme in KaZa is pursuing, as these are important for the strengthening of wildlife conservation and empowerment of rural communities.

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V. THE HUNTING SYSTEM

Charles Jonga, Moses Chibesa, Ngawo Namukonde, Monicah Mbiba and Moreangels M. Mbizah

Introduction

This chapter is part of Result 2 of the SWM Programme which focuses on improvement of the management of wild species resilient to hunting or fishing in Inyasemu and Simalaha CCs in Zambia, and the Mucheni CC in Zimbabwe. The objectives of this chapter are to provide, in coherence with the theory of change of the SMW Programme in KaZa, an overview of the:

- status of wildlife populations in the three CCs;
- existing and potential wildlife-based enterprises in the three CCs; and
- state of illegal hunting (poaching) of wildlife in the three CCs.

From studies conducted under the SWM Programme in the KaZa sites, local communities have shown unparalleled interest in the establishment of the CCs as a way of increasing benefits from wildlife for local communities. The SWM Programme's approach recognizes that active participation by rural communities in the management of wildlife resources must produce tangible benefits, so that they fully appreciate wildlife resources as assets requiring protection. However, successful community-based wildlife management is dependent upon the presence of viable populations of wildlife in the CCs, and tolerance of increased numbers of wildlife in the face of human and wildlife conflict from some species. It is also through improved governance and management models that wildlife can claim its place in the CCs as an economic enterprise that can withstand the pressures of habitat degradation and wildlife poaching, thereby opening up new opportunities for alternative livelihood options.

Materials and methods

The approach and methodology in this chapter are based on data collected during wildlife surveys and other SWM Programme documents, as well as reviews of various literature sources, and consultations with different key stakeholders of the concerned landscape. The data were collected with the agreement of the communities.

The following are some of the reports used by the authors:

- Ecological Limitations: Inyasemu Community Conservancy (Namukonde, 2020);
- Mucheni Community Conservancy Baseline Survey (BLS) Report (Le Bel and Usman, 2020);
- Food security and wild meat consumption among people of Nyawa in Southern Province, Zambia (Chileshe and Lepiller, 2020);
- Feasibility study on wildlife enterprises of the Binga district (Jonga *et al.*, 2019);
- Bird Survey Report for the proposed Inyasemu Community Conservancy in Kazungula and Mwandi districts (Chibesa, 2020);
- Abundance and distribution of wildlife and human presence in wards 3, 4 and 5 in Binga district, Zimbabwe (Mbizah, 2020)

A. Ecology and population status of hunted species

A.1. Key results

Inyasemu, Simalaha and Mucheni CCs are strategically located as they lie within the Kavango-Zambezi Transfrontier Conservation Area (KaZa-TFCA) that seeks to sustainably manage the Kavango and Zambezi ecosystem based on best conservation and tourism models. All three CCs are viewed as important areas of connectivity for wildlife within the KaZa-TFCA and are host to a number of species and scenic sites of tourism appeal.

A.1.1. Wildlife abundance and distribution in Simalaha and Inyasemu CCs

With the support of Peace Parks Foundation (PPF), a fenced wildlife sanctuary was established in Simalaha CC. This afforded the reintroduction of large and medium-sized game including 96 zebras (*Equus burchellii*), 25 lechwes (*Kobus lechwe*), 44 pukus (*Kobus vardonii*), 240 impalas (*Aepyceros melampus*), 25 waterbucks (*Kobus ellipsiprymnus*), 7 giraffes (*Giraffa angolensis*), 155 blue wildebeests (*Connochaetes taurinus*) and 198 buffaloes (*Syncerus caffer*) (Duporge *et al.*, 2019). Many more species are planned for reintroduction and although today fenced, it is planned that SCC will one day drop its fences and become a core conservation area for wildlife movements. In Inyasemu CC, the populations of large to medium-sized species is extremely low with the exception of a few species whose populations may be stable (Namukonde, 2020). These include kudu (*Tragelaphus strepsiceros)*, common duiker (*Sylvicapra grimmia)*, vervet monkey (*Chlorocebus pygerythrus)*, chacma baboon (*Papio ursinus griseipes)*, spotted hyena (*Crocuta crocuta*), leopard (*Panthera pardus)*, side-striped jackal (*Canis adustus)* and African civet (*Civettictis civetta)*. Elephant (*Loxodonta africana)* and lion (*Panthera leo)* sightings are extremely rare (Namukonde, 2020). The threats to this wildlife population will need to be assessed and addressed in order to grow and sustain a healthy population through restocking of plains game.

The growing numbers of animal populations in SCC are attributed to the translocation of species into the sanctuary. Based on the recent animal counts, an increase in the population has been recorded for a number of species of game animals for which harvest quotas are proposed (Table V.1). In ICC, protocols for animal counts have been established, but they have not yet been conducted. Regardless, encounter rates of buffalo, elephant, impala, leopard, lion and zebra are extremely low, and some species were last encountered about 4–6 years ago. The SWM Programme in KaZa will need to assist with putting in place interventions that will result in an increase in wildlife numbers in the CC.

Table V.1: Ground counts 2013–2019, Simalaha CC (Duporge *et al.*, 2019)

Species	2013	2014	2015	2016	2017	2018	Total Translocated	January 2019 Game Count Total	Proposed 2019 quota
Red Lechwe			25				25	59	
Puku			32	12			44	9	
Impala	100		140				240	150	15
Waterbuck	25						25	0	
Zebra		50	28		18		96	149	2
Giraffe			7				7	5	
Blue Wildebeest		135		20			155	448	10
Buffalo						198	198	142	6
Hippo									1
Crocodile									1

The report from which this table is drawn explains that the animal counts were conducted during the time of the year when visibility was poor due to the vegetation leaf flush, hence not all species were sighted.

A.1.2. Wildlife abundance and distribution in Mucheni CC (MCC)

A combination of camera trapping and recce surveys were conducted in Wards 3, 4 and 5 that make up MCC (Figure V.1) to assess the distribution and abundance of wildlife in these three Wards (Mbizah, 2020). Significant portions of natural habitats remain in MCC, i.e. north of Ward 3, the area adjacent to Chete Safari Area (Block A), along the Chizarira National Park, south of Wards 3, 4 and 5 (Block B) and in the north of ward 4, the area adjacent to Chete Safari Area (Block C) (Figure V.1).

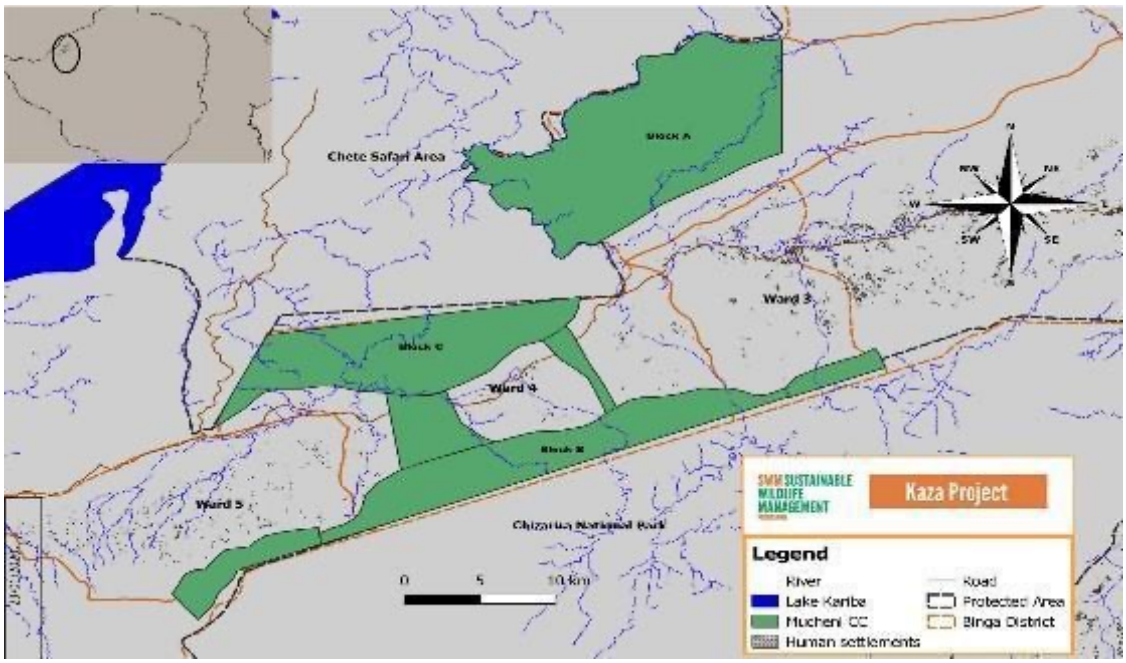
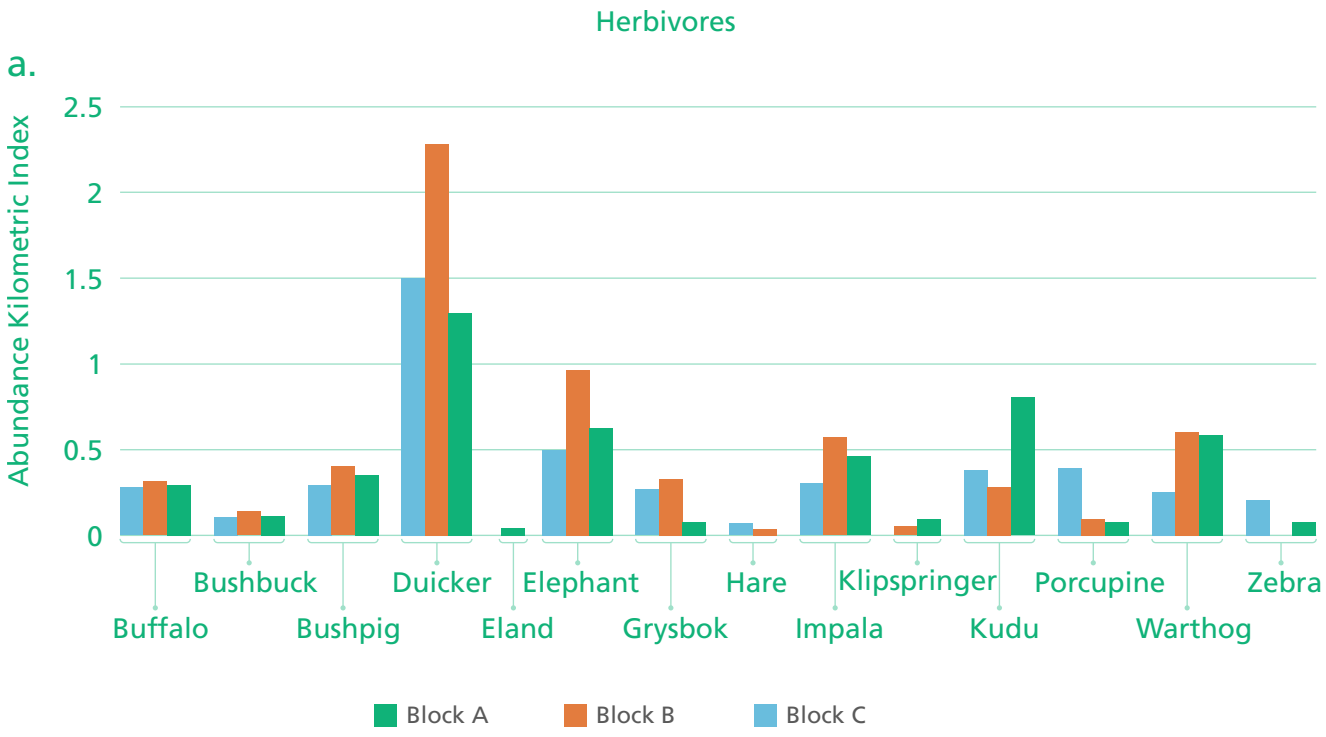


Figure V.1: The location of the survey areas (Blocks A, B and C) inside wildlife areas of wards 3, 4 and 5 in Mucheni CC, with the insert map showing the location of Mucheni CC in Zimbabwe (*Source:* Mbizah, 2020)

Figure V.2: The combined Kilometric Abundance Index (number of individuals encountered per km of road walked) of herbivore species in Blocks A, B and C of Wards 3, 4 and 5 in Mucheni CC, Zimbabwe (*Source:* Mbizah, 2020)



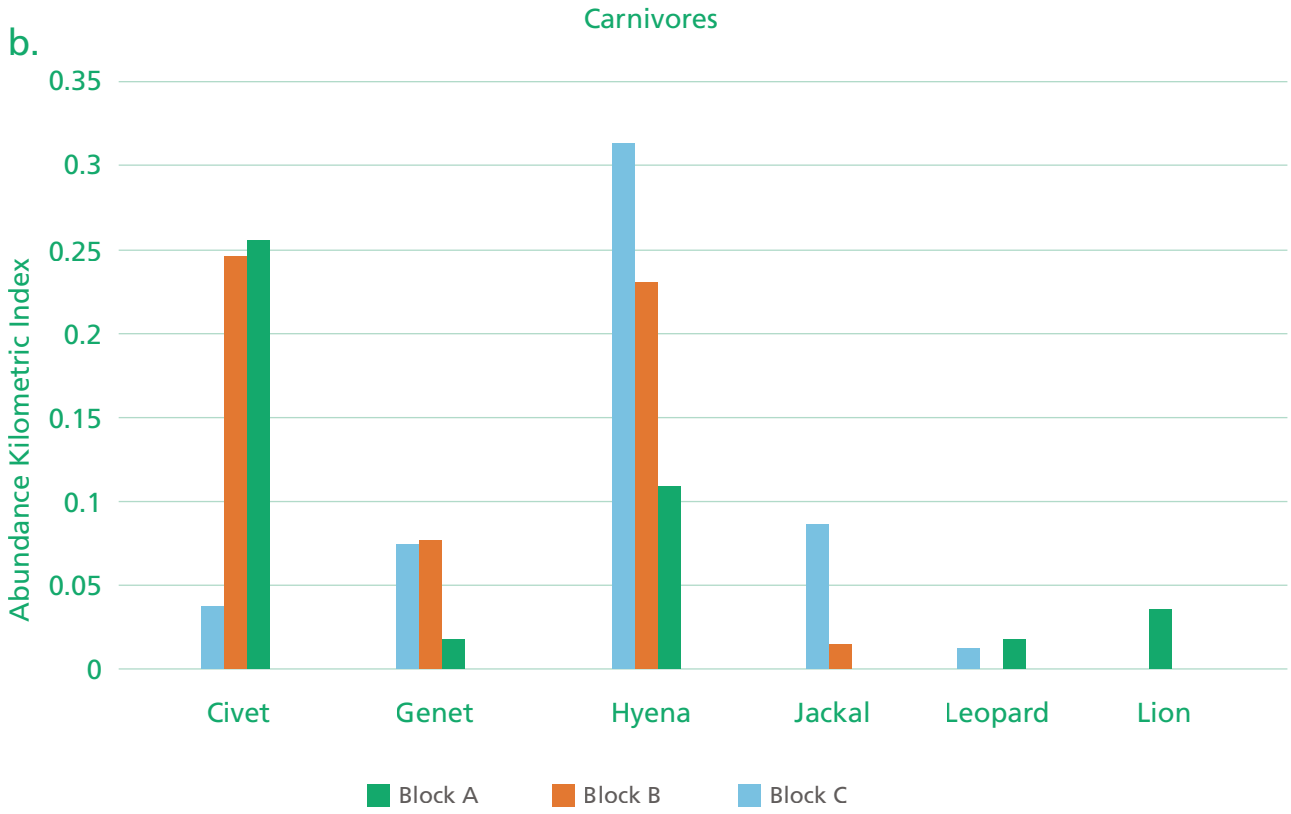
Results from this survey showed that the wildlife habitat in the three blocks is intact and able to support a wide range of wildlife species, from birds to large herbivores and large carnivores. The combined indices of abundance (spoor, faeces and sighting) across all species showed that the common duiker was the most abundant herbivore species across the three blocks (Figure V.2). Spotted hyena was the most abundant carnivore in Block A, while African civet was the most abundant carnivore in Block B and C (Figure V.3).

The camera trapping rate also showed that the common duiker was the most abundant herbivore species across all three blocks (Figure V.4). Genet (*Genetta genetta*) was the most abundant carnivore in Blocks A and B, while aardvark (*Orycteropus afer*) (an insect eater) was the most abundant in Block C (Mbizah, 2020). Baboon was the most abundant omnivore across all blocks (Mbizah, 2020).

The presence of elephants (Figure V.5) and other large herbivores like buffalo, eland (Taurotragus oryx), kudu and zebra signifies that the habitat is still able to support these important species. However, because of the low abundance of large herbivores (which are the major prey species for large carnivores), the presence and abundance of large carnivore species were also low. The large carnivore population is also facing threats from human–wildlife conflict as they get killed by the community in retaliation for livestock loss and human attacks. Nonetheless the abundant small herbivores (e.g. common duiker and Sharpe's grysbok) are still supporting the small and medium carnivore populations (e.g. caracal [Felis caracal] and hyena).

The factors affecting the occupancy and distribution of wildlife species varied across the three

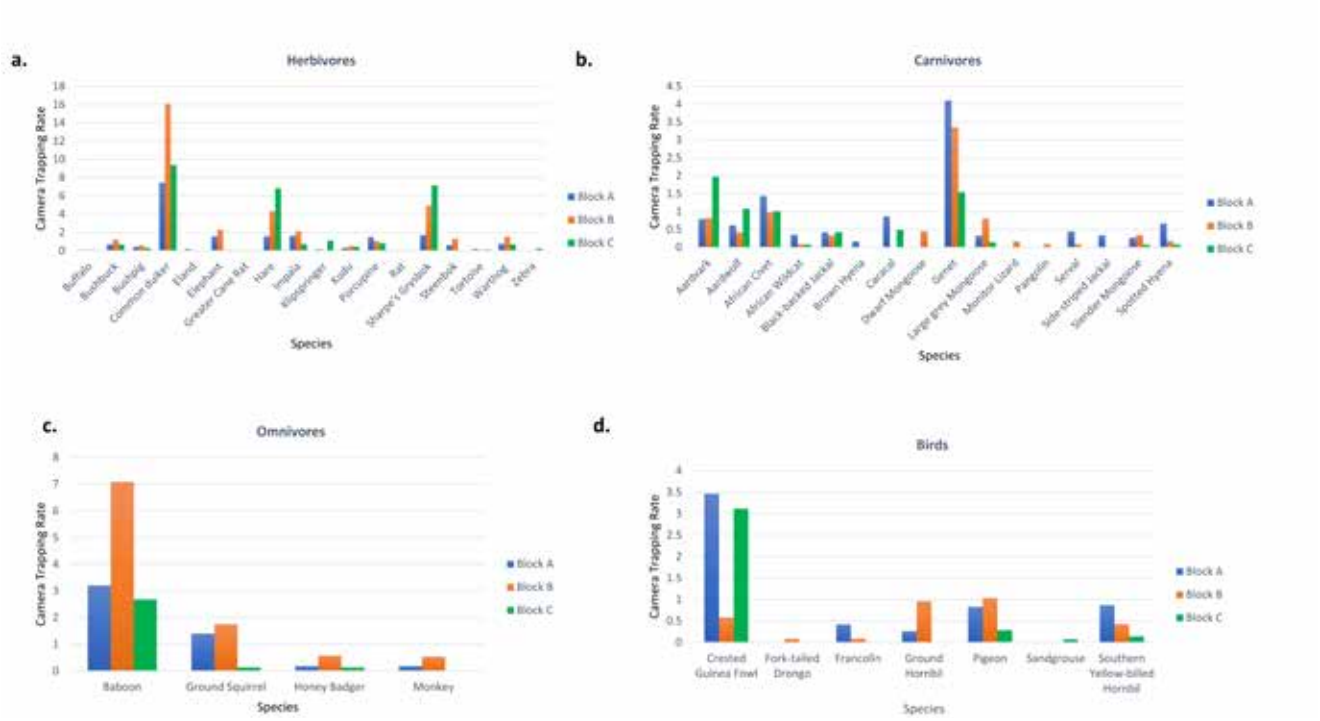
Figure V.3: The combined Kilometric Abundance Index (number of individuals encountered per km of road walked) of carnivore species in Blocks A, B and C of wards 3, 4 and 5 in Mucheni CC, Zimbabwe (*Source:* Mbizah, 2020)



blocks. Common duiker occupancy in Block A increased as distance to protected area (Chete Safari Area) increased (Mbizah, 2020). Common duiker is one of the species mainly snared and hunted by poachers, and the pattern of its distribution in Block A might suggest that common duiker were avoiding areas close to the edge of the protected area where most of the snares are set up to trap animals moving between the protected area and the communal wildlife areas. The low occupancy close to the protected area boundary may also be because common duiker may have been hunted out of these areas. In Block B, the probability of occupancy for common duiker increased as the camera trapping rate of humans increased, decreased as distance to the nearest river increased, decreased as distance to the nearest protected area increased and increased as distance to the nearest human settlement increased (Mbizah, 2020). The high occupancy of common duiker where the camera trapping rate of humans was high may suggest that poachers are mainly targeting sections of the wildlife area where common duiker are found. In Block C, the probability of occupancy for common duiker increased as the distance to the nearest river increased. This could mean that common duiker in Block C might be avoiding rivers, which are also areas where most of the snares are set up by poachers to catch animals that come for water (Mbizah, 2020).

For elephants, the probability of occupancy in Block A decreased as the camera trapping rate of humans increased and increased as distance to the nearest human settlement increased (Mbizah, 2020). In Block B the probability of occupancy for elephants increased as the distance to the nearest human settlement increased (Mbizah, 2020). In both these blocks elephants were mainly found in areas with little human activity and far from human settlements. This distribution

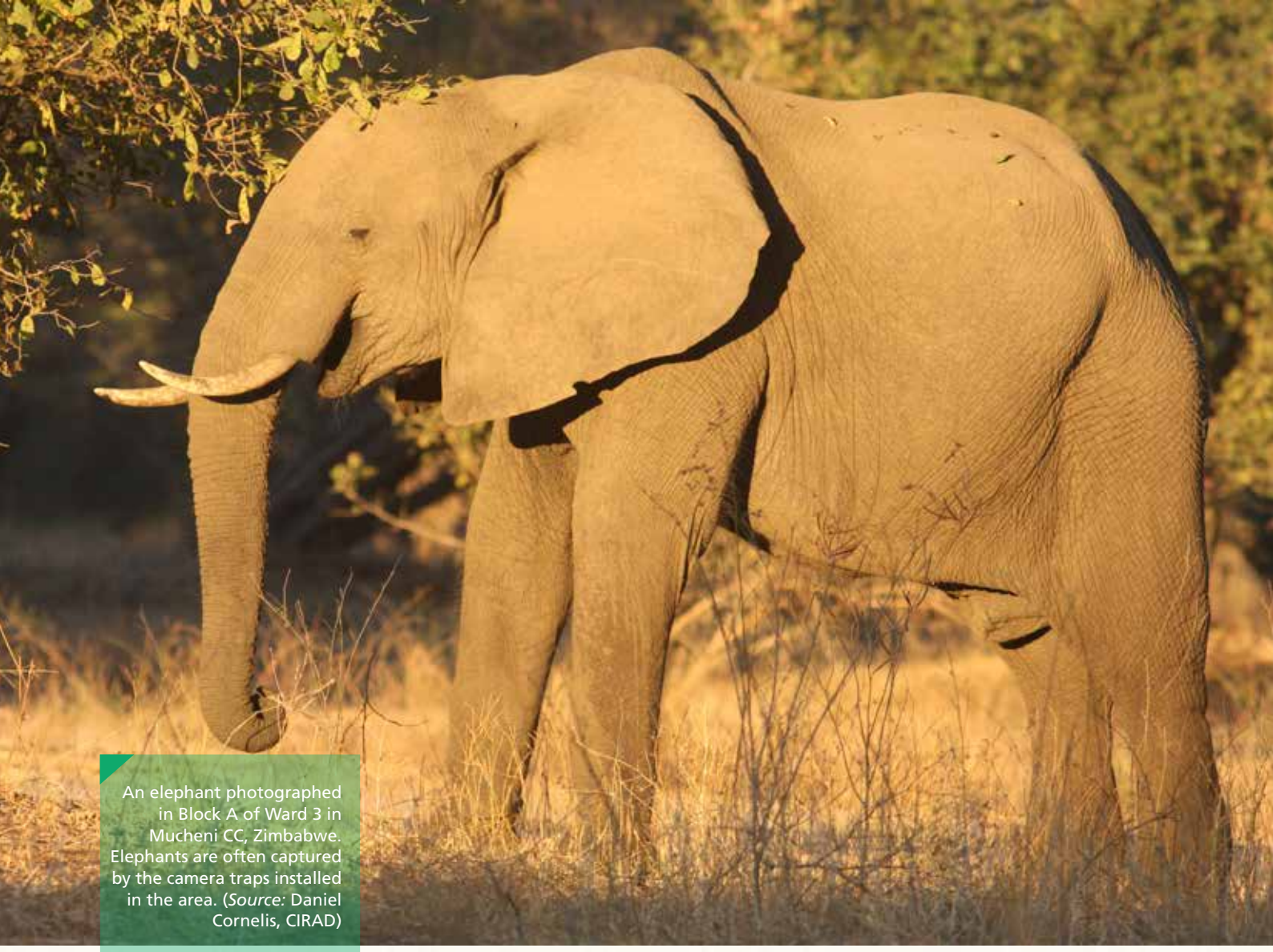
Figure V.4: The camera trapping rate (an index of abundance) of herbivore species in Blocks A, B and C of wards 3, 4 and 5 in Mucheni CC, Zimbabwe (*Source:* Mbizah, 2020)



pattern suggests that elephants might be avoiding human settlements and also avoiding sections of the wildlife area that are most frequented by humans; this could be because of the fear of humans caused by a history of antagonism (human–elephant conflict) which has instilled a fear of humans in this elephant population.

Block A was the wildlife area most affected by human interference since people have encroached into the wildlife area for crop farming activities. There is a need for a community-based and community-driven land planning in this area to prevent further encroachment into wildlife areas which might wipe out the remaining wildlife population. Poaching activities were also highest in Block A: several photos of people with items used for poaching like snares and spears and with animal remains were recorded. There were a number of people carrying bags, sacks and buckets captured by the camera traps in the Northern part of Block A. This suggests that this area is being used as a route to access a major river where fishing activities are happening. There is a risk that people passing through this area can also illegally hunt the wild animals as they pass through. The resource monitors recruited by the SWM Programme in each ward will play an important role in monitoring and reducing the poaching activities in these wildlife areas.

The data on wildlife population abundance and distribution and on human presence and activities in MCC provided baseline information on the efficacy of current management, allowing the assessment of specific management interventions that could potentially be implemented over time. This survey revealed that Mucheni Community Conservancy is a critical wildlife habitat and it is still intact and supports a viable wildlife population.



An elephant photographed in Block A of Ward 3 in Mucheni CC, Zimbabwe. Elephants are often captured by the camera traps installed in the area. (*Source:* Daniel Cornelis, CIRAD)

A.2. Way forward

Establishment of management plans for the Conservancies is fundamental and the SWM Programme in KaZa has contracted consultants for this activity. This is intended to guide resource use and protection for the benefit of both the local communities and their posterity. All management actions will be enshrined in management plans and will at least incorporate the following aspects:

- a comprehensive description of all the elements of biodiversity involved, including the assessment of the population status of wildlife for purposes of estimating carrying capacity and stocking rates;
- determination of the available manpower, expertise and finances;
- determination of land use patterns in the surrounding areas;
- prediction of future trends and needs of the area and its users;
- compilation of a timetable for implementing the management plan;
- description of all the realistic options that may exist for helping to achieve the manpower, finances and available expertise;
- choice of preferred options and description of management plan based on them;
- setting up a comprehensive monitoring plan for determining the impact of the management actions on the ecosystem;

- constant re-evaluation and readjustment of management plan and set objectives; and
- development and establishment of business plans for resource use, including consumptive and non-consumptive tourism. It is highly desired that the three conservancies be integrated into already existing tourist routes and that business plans developed take on models that promote private community partnerships.

The area surveyed by the SWM Programme in Wards 3, 4 and 5 of MCC is a critical wildlife habitat. It currently supports a viable wildlife population. However, this population is facing some threats including habitat loss due to conversion to agricultural land and subsistence poaching. There is an urgent need to address these threats so the wildlife population can continue to flourish, which would also allow sustainable utilization by the surrounding communities and provide opportunities for economic development. When these communities benefit from these wildlife resources, wildlife would stand a better chance of being protected in the long term.

One of the sure strategies to revive wildlife populations and their conservation is to establish and strengthen resource protection efforts in CCs. This strategy has already begun yielding results as demonstrated in MCC and has great potential to grow wildlife populations, as wildlife tends to congregate in areas that have less poaching pressure. This strategy should be coupled with clear demarcations of CC boundaries that will help guide the policing of conservancy resources. With effective resource protection mechanisms in place, much success is guaranteed for subsequent restocking exercises. Restocking for all three conservancies is key, as it will accelerate the rate of population recoveries. However, emphasis will be placed on the reintroduction of species, particularly those with tourism (non-consumptive and consumptive) appeal.

Resource monitors' foot patrols will generate very useful data that can be used to monitor and assess the different management interventions applied on population and habitats. As they are always on the ground, they are more likely to traverse all areas of the conservancies in a given year and should be used effectively to generate data for research purposes. In order to have comparable results, all CCs should adopt standard practices that can generate information to aid decision-making. One of the most widely used approaches by communities to generate data is the Management Oriented Monitoring System (MOMS). This is a simple and easy-to-use system that enables communities to collect data, analyse and report. It is all paper based, although the data gathered can be copied to an electronic database for more sophisticated analysis and reporting. Bio-Hub Trust (BHT) was engaged by the SWM Programme in KaZa to develop MOMS in Binga District, including the MCC, and this will be further developed to allow for more detailed analysis. There are other systems available, i.e. the Spatial Monitoring and Reporting Tool (SMART) that is currently being used in the Kafue Ecosystem. This has yielded great results; however, it requires a complement of electronic gadgets to operate, which common users such as rural dwellers may not have.

A number of tools have been developed to help protected area managers monitor and assess their effectiveness to manage and protect natural resources. Normally, data obtained from patrol teams equipped with data capturing tools (i.e. Global Positioning Systems – GPS, cameras, radios, tablets, smartphones or data entry forms) provide details of their encounters (e.g. geo-referenced encounters of animals, illegal activities, fires) which are analysed to provide both qualitative and quantitative results that can be used to assess effectiveness. Other techniques include unmanned aerial vehicles (UAV) that have in recent times shown great promise for

monitoring ecological processes, populations and illegal activities (Duporge *et al.*, 2019). The SWM Programme in KaZa has since developed field techniques and methods under its dedicated data management plan (DMP). However, as the analysis and interpretation of data generated by patrol teams and UAV requires a higher level of expertise and as a long-term achievement, it could be encouraged to empower CCs to outsource this expertise or build their capacity through long-term training. In the meantime, the wildlife experts from the state authorities will be engaged to analyse and provide feedback on an ad hoc information service basis.

B. Income generating wildlife-based enterprises

B.1. Key results

B.1.1. Trophy hunting

Hunting is currently practised in the lower escarpment core area of MCC in Ward 4, where the local authority in the form of the Binga Rural District Council (RDC) has appropriate authority (AA) status accorded through the Parks and Wildlife Act (Figure V.6). On behalf of the community, the RDC selects a private safari operator for the conservancy through a tender process. Currently, the safari operator is Tokoloshe Safaris, which deals directly with the RDC on behalf of the community. The SWM Programme in KaZa is facilitating a process to formalize the expanded MCC, which incorporates Wards 3, 4 and 5. The wards could be organized into a conservancy institution which will be the legal entity for MCC to enable management and business operations. This entity is expected to be formalized in 2021 (Figure V.6). A constitution was signed by the founding members of MCC, and will be improved for the establishment of the community institution as a legal body. The community institution will be supported in management and business development by the Rural District Council through its Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) unit. In addition, an

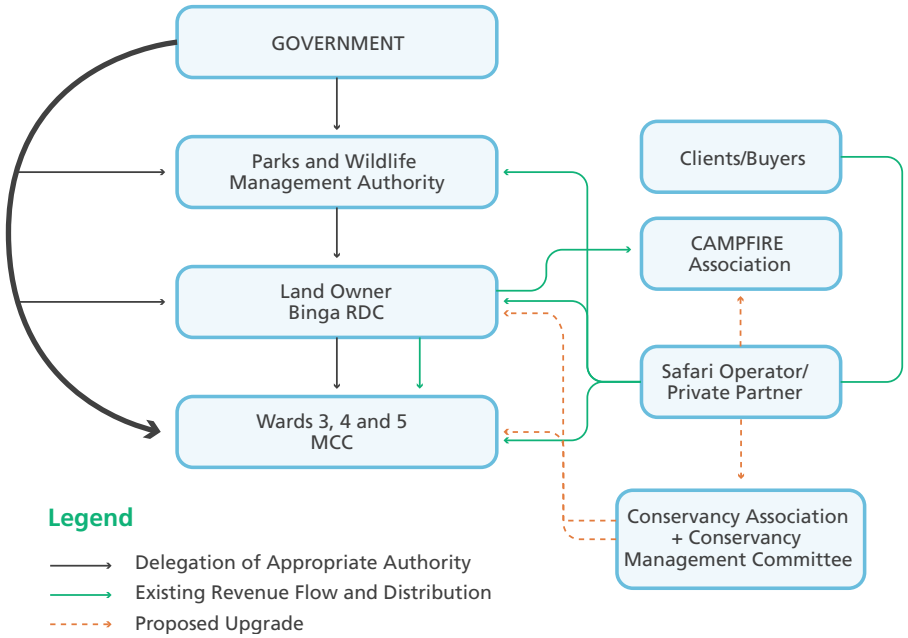


Figure V.6: Existing and proposed institutional arrangements for Mucheni CC, Zimbabwe (*Source:* Jonga *et al.*, 2019)

MCC Management Committee will be established under the community institution, comprising the local chiefs from Wards 3, 4 and 5, as well as the elected councillors. A feasibility study on wildlife enterprises of the Binga District by Jonga *et al.* (2019) recommended a shift in the institutional model to be more grassroots-based, to increase community participation in the conservancy business. The community institution will be a legal, non-profit entity registered with the government under the Private Voluntary Organizations Act. The daily running of the conservancy business will be undertaken in conjunction with the safari operator(s) and an SWM Programme Community Liaison Officer, who has already been appointed. In future, the community institution can be turned into a community trust; the SWM Programme in KaZa has contracted a local partner, the Zimbabwe Environmental Law Association (ZELA) to further this.

In Zambia, the creation of conservancies is enabled by the Zambia Wildlife Act of 2015 which makes provision for the establishment of diverse protected areas, including conservancies and community protected areas. The Act also enables the local communities to develop management plans and sustainable community projects for community development and well-being. Existing institutional arrangements have been established for game management areas (GMAs) for the benefit of communities through the Department of National Parks and Wildlife since the 1990s. In Simalaha, a Community Development Facility (CDF) was recently established to assist with the new business structure. The funding for the business entities will be administered by the CDF until the Simalaha Community Conservancy Trust has developed the capacity to manage funding. Then, training and capacity building will be organized through this structure. For the Zambia sub-sites, there are currently no community-operated sport hunting activities. However, there is one sport hunting enterprise operated by a private operator, Mulimo Safaris, which undertakes trophy hunting activities in the Sichifulo GMA, which is adjacent to the Inyasemu and Simalaha CCs. Trophy hunting in the area is largely undertaken by international hunters. The main species hunted include elephant, lion, buffalo, leopard and sable antelope (*Hippotragus niger)*.

B.1.2. Levels of offtake

Zimbabwe's Mucheni CC was previously part of the Manyenyengwa-Siabuwa Hunting Concession under Binga RDC. The area had a sizeable hunting quota in the past (Table V.2), the main species on quota being elephant, buffalo, impala, leopard and kudu. However, analysis of available hunting data shows poor utilization of the approved quota up to 2012, with virtually no actual hunts undertaken thereafter until 2018. Quotas and offtake levels for different species across eight years are shown below.

Table V.2: Allocated hunting quotas for the Manyenyengwa-Siabuwa Hunting Concession (light green) and actual hunts (white) 2012–2018 (*Source:* Binga RDC CAMPFIRE data, 2019)

Species	2012		2013		2014		2015		2016		2017		2018	
Elephant	3	0	3	0	4	0	4	0	2	0	4	0	4	2
Buffalo	1	0	6	0	5	0	5	0	4	0	4	0	4	1
Leopard	3	1	0	0	1	0	1	0	1	0	1	0	1	0
Kudu	2	1	2	0	2	0	2	0	2	0	2	0	2	0
Impala	2	0	2	0	2	0	2	0	2	0	2	0	3	0

Hunting is legal for most of the year. However, most hunting takes place between April and October to avoid the rainy season. Safari operators apply for their hunting quotas from ZPWMA based on game counts that would have been made in the concession. From 2018, MCC was allocated its own small hunting quota and utilized part of this as a stand-alone concession. RDC records show that one trophy elephant bull was taken in 2019 (Table V.3).

Table V.3: Trophy Hunting Quotas for Mucheni CC 2018–2019 (*Source:* ZPWMA, 2020)

Species	2018	2019
Crocodile	1	1
Buffalo	2	2
Eland	1	1
Elephant	1	1
Impala	2	2
Lion	0	1
Leopard	1	1

The hunting quota in MCC may be reflective of the stocking rates of the hunted species. In the neighbouring Sijarira Forest, there are five times more individuals per species on the hunting quota than in MCC, which is nearly three times its size (Jonga *et al.*, 2019). In Chete Safari Area (the hunting area that lies north and north-east of MCC), the size of quota is small compared to Sijarira Forest, as its commonly hunted species (i.e. buffalo and elephant) are on the decline. Chete Safari Area is around 40 times larger than Sijarira Forest. However, other ecological factors may be at play that may influence the stocking rates. For instance, Sijarira Forest has more vegetation cover, and anecdotal evidence suggests that both the Chete Safari Area and MCC had in the past suffered overharvests and human encroachment on wildlife habitats (Jonga *et al.*, 2019).

In the early 1990s through to the early 2000s, commonly hunted species were the large and medium-sized ungulates, cats and birds (Jonga *et al.*, 2019; Namukonde, 2020). Today, the most commonly hunted species are birds and small mammals, which indicates the scarcity of large and medium-sized game. As all three CCs lie within communal lands and have yet to establish management plans, the hunting practice is rarely licensed, illegal and unsustainable, except for MCC. In 2018, Ward 4 of MCC was allotted a small hunting quota (Table V.3). This followed the propped resource protection efforts by the local communities that resulted in the return of a number of hunted species including buffaloes, warthogs, bushpigs, elephants, kudus, impalas and lions. Despite this, far less than 40 percent of the quota has been utilized with hunting success of elephant and buffalo (Jonga *et al.*, 2019). This could be because hunters are mainly interested in big game and other high value species and small game is usually just add-ons.

Fees paid by private operators for various licences are reviewed regularly by the Parks and Wildlife Management Authority through statutory Instruments, for example, Statutory Instrument 108 of 2019 (Parks and Wildlife Management Authority Tariff Fees – By-Laws). Prices for live animal sales vary, as they are determined by the appropriate authority (AA) on application by prospective buyers. Trophy fees and type of game products for sale also vary by

species. The current minimum trophy fee for a bull elephant whose tusks weigh less than 23 kilograms is USD 9 200. Under CAMPFIRE, communities receive 55 percent of the trophy fees.

According to an SWM Programme feasibility study report, only one crocodile was hunted in the Manyenyengwa-Siabuwa concession in 2017 (Jonga *et al.*, 2019). The proceeds amounted to a sum of USD 600, which was shared by all the communities for development and conservation works in the seven wards that made up the concession. Out of these, Sinampande (Ward 3), Sinansengwe (Ward 4) and Sinakoma (Ward 5) are the wards that now make up MCC. Efforts have to be made to ensure that the benefits from trophy hunting accrue to those communities directly affected by the wildlife, as the current levels of benefits are negligible for larger numbers of communities.

B.1.3. Photographic tourism

There is little to no marketing of MCC currently as a photographic tourism destination, especially after the collapse of Chizarira Lodge within the conservancy, on the approach to Chizarira NP. The lodge ceased operations several years ago, and suffered destruction from a wildfire at the time of writing this report (November 2020). Also, there is very little visibility of Chizarira NP, which could significantly benefit Mucheni. However, there is great potential for growth. Websites dedicated to providing information about the area should be established to increase visibility. There are indications that the online reputation of Chizarira Lodge was once highly positive on platforms such as TripAdvisor, even when the conditions were no longer as good as in the past. So it will be reasonably easier to build on that online profile of the conservancy for non-consumptive tourism in its upper section. For the lower section, historical hunting clientele from nearby hunting concessions in Chete SA and Sijarira Forest can be used to market the mainly small plains game in MCC. Clients in these protected area hunting concessions are dominated by the United States of America (over 90 percent). These are now being replaced by European clients, especially Spanish and Hungarian, although reasons are unclear. Most of the clients are attracted through references and word-of-mouth, as the hunting sector is a relatively closed business. As such, it is extremely important to maintain a good track record and operational standards.

Inyasemu and Simalaha CCs in Zambia also hold potential for both trophy hunting and photographic tourism. First, they can attract hunters who will most likely be interested in hunting plains game species such as impala, kudu and wildebeest. Second, and if the concessions are successfully restocked with other high-value species such as lion and leopard, there will be potential for high-paying international hunters and photographic tourism clients in relevant parts of the CCs.

The common feature of the three CCs under the SWM Programme in KaZa is the potential for enhanced wildlife protection for sustainable livelihoods of the communities. Prospects for viable hunting and photographic tourism operations in the CCs can be boosted by wildlife restocking.

For both countries, results of initial assessments by the SWM Programme in KaZa show: (i) good vegetation structure, composition and condition; (ii) presence of low populations of some wild animal species; (iii) high potential ecological capacity of the CCs to accommodate additional wild animals; (iv) opportunities for restocking to enhance wildlife conservation; and (v) high acceptance of wildlife restocking by the local community as a way to improve their livelihoods. In Zambia and Zimbabwe, wildlife restocking is guided by necessary feasibility studies to determine

stocking densities, source of animals, type of species and sex ratios, and technically sound capture and translocation protocols based on IUCN guidelines for capture and translocation, national wildlife laws and regulations on wildlife conservation and the KaZa-TFCA management guidelines. Where trophy hunting is an option, general practice is that hunting is not conducted after translocation until an area is sufficiently stocked with wildlife.

Most of the tourists that visited the region in 2016 and 2017 were mainly from the SADC countries. If photographic tourism is to be revived in the area, there is a need to market to international clients. The major task at hand for communities of CCs is to maintain the products so they can maintain both local and international clients. There is a need to maintain the infrastructure that is needed for running the concessions as businesses. With the help of partners, and aggressive marketing through different platforms, these CCs could become better known as tourism destinations. Being part of the KaZa-TFCA, the CCs can also benefit from the tourism business created by the destination as a whole.

B.2. Way forward

In Inyasemu and Simalaha, there are currently no benefits accruing directly from sport hunting. The communities realize that benefits could potentially increase by restocking the conservancy with wildlife populations in the future as indicated above. However, the communities are divided when it comes to wildlife use options, as the Senior Chief in the area, Chief Inyambo Yeta, is against consumptive nature-based enterprises, including trophy hunting, instead advocating for non-consumptive enterprises. There are opportunities to undertake nature-based tourism enterprises such as sport fishing, boat cruising, canoeing, game viewing, photographic tourism, recreation picnics or camping, bird watching, nature trail walks and the promotion of education and research tourism. Evidence of which among these alternative nature-based enterprises or trophy hunting can generate more revenue for local communities is unavailable. In Sichifulo GMA nearby for instance, revenue is realized from trophy hunting through a hunting operation that is being run by a private operator that has been attracting both local and international clients into the area. The operations have benefited local communities through employment and infrastructure development. The operator has employed 10 local community members on contract and 20 casual workers, and contributed to the construction of a clinic, community schools, an office block for wildlife officials and Game Scouts at Mulanga Wildlife Camp in the area. Besides, the operator has supported the recruitment of village scouts to support wildlife management. Since existing practices within the landscape revolve around both hunting and photographic tourism based on different environmental, financial, economic and social considerations, further understanding is needed.

The SWM Programme in KaZa has initiated a study to assess existing consumptive and non-consumptive resource utilization value chains and recommend business models suitable for the range of products in MCC. Many rural communities still rely on wild sources of food; in communities surrounding MCC, there is widespread consumption of wild sources of food to augment agricultural produce. Legally, residents can get wild meat as a by-product of trophy hunting activities by the private operators. Besides, due to the current low numbers of wildlife and small trophy hunting quota, the meat is seldom sufficient to cater for the protein needs of the communities. In addition, the private operators are under no obligation to give the meat from their hunts to local communities. This creates the need for a formal or legal arrangement

between the operator and the community concerning meat benefits from trophy hunting activities, as is standard practice in other areas under the CAMPFIRE programme. The lack of such agreements, unless backed up by alternative protein sources, often results in illegal hunting by local communities, which undermines conservation. The SWM Programme in KaZa has taken consideration of these issues and in its Year 3 work plan there are proposals to implement activities aimed at increasing the wildlife population and diversifying the sources of protein in the human diet. Plains game such as impala, kudu, buffalo and zebra among others could be developed into a legal source of wild meat for local communities through management of offtakes in addition to well-zoned trophy hunting and photographic tourism options, for purposes of both fighting poaching and supplementing of protein. Through zoning, a variety of species will attract both big game hunters and photo tourism enthusiasts.

Moving forward it is imperative that:

- government entities, responsible for protected area management and hunting operations, facilitate the establishment and capacity building of CCs as well as their management structures for increased decision-making over wildlife utilization;
- government, through the local authorities, undertakes infrastructure development and maintenance to support hunting and photographic operations (roads, fireguards, accommodation and water points) in the CCs;
- the private operators, with the support of Parks agencies, complement game restocking efforts to improve hunting benefits, including wild meat from cropping sold at reasonable prices within CCs. Restocking the areas should be done for game species that historically inhabited the area, accompanied by improved wildlife monitoring systems and law enforcement, and compliance with country regulations;
- the CCs, with the support of the SWM Programme in KaZa and responsible authorities, adopt several business models to support revenue generating enterprises, conservation and community development;
- the local authorities in partnership with the communities set up initiatives to reduce poaching and human–wildlife conflict, which is key to the success of the CCs.

Community-based wildlife enterprises have been widely criticized both locally and regionally, by different players in the academia, development and animal rights sectors. Major criticisms have mainly focused on the minimal monetary benefits accruing to communities at household level from trophy hunting operations. Also, there has been increased pressure to ban trophy hunting from international actors, particularly by animal rights activists. Pressure on social media is mounting for countries in southern Africa to stop trophy hunting, although this model of conservation has worked for remote areas with little agricultural or photographic tourism potential. Community-based wildlife enterprises also face pressure from increased poaching which reduces the viability of the business, and should form synergies with other law enforcement agencies to counter poaching. Indeed, there is a greater need for transparency in governance, increased community involvement and fair distribution of benefits. The wildlife enterprises should also seek to produce tangible benefits that accrue at household level over and above communal social services, based on choices made by the communities themselves. Also, there is a need for more research by experts in the region to balance the dominant anti-hunting narratives.

C. Poaching – "hunting for the pot"

Millions of people depend on wild resources for food and income. This includes vegetables, fruits, fish from rivers and wild meat. Wild meat is an important source of protein, fat and micronutrients, particularly for Indigenous Peoples and rural communities in tropical and subtropical regions of Africa, Asia and Latin America. As illustrated in the preceding section, reasons for illegal hunting in the CCs are predominantly because of the need for meat. In communities surrounding the CCs, there is widespread consumption of wild sources of food to augment agricultural produce. Also, wild food is traded by residents and in markets in nearby towns and cities to generate household income. Increased wild meat production from viable populations can boost both meat production and revenue generation for local communities. Also, other wild meat sources as well as fish could be supported as one way of reducing or managing demand for wild meat.

C.1. Key results: poaching dynamics

As already indicated from SWM reports mentioned in this chapter, local people in the three CCs are engaged in some form of poaching of game for wild meat consumption and trade for various reasons. These include:

- wild meat as a major source of protein and food security;
- lack of employment; and
- income generation to supplement other income generating activities such as subsistence farming and charcoal production.

In these CCs, young people (mainly men) are mostly involved in hunting. There is no data on age groups involved in illegal hunting from recent studies on the three conservancies. However, previous studies in Zambia and some countries in Africa (Lindsey *et al.*, 2013; Akinsorotan *et al.*, 2020; Loibooki *et al.*, 2002) have indicated that mainly young and middle-aged men are engaged in bushmeat hunting. Loibooki *et al.* (2002) indicated that the age category ranged from 15 to 65 years with very few individuals above the age of 65 engaged in bushmeat hunting. Hunted species (mammals and birds) are mainly used for consumption, trading, mitigating human–wildlife conflict (HWC) and for customary uses such as traditional ceremonies and as a symbol of masculinity and power for young men in the community. Personal communication shows that, for MCC, the most poached species belong to the family of birds and small-to-medium herbivores. Other animals hunted to a lesser degree include wild pigs, rodents, elephants, fish, monkeys, big-to-medium carnivores and reptiles (Le Bel and Usman, 2020). In Inyasemu and Simalaha CCs, mainly small mammals and game birds are hunted. For small mammals, these include species belonging to rabbits, rodents namely squirrels, and duikers. For birds, species belonging to quails, doves, pigeons and guinea fowl are mainly hunted. During the rainy season, some species of reptiles and amphibians are occasionally hunted even though they are not highly valued prey (Chileshe and Lepiller, in prep.). However, the impact of poaching and "over-hunting" remains largely speculative as this is difficult to assess, especially when evidence is not available. Nevertheless, management planning for the CCs should take into account the threat of poaching; in this regard, law enforcement efforts should be improved and increased to ensure the sustainability of the envisaged reintroduction of wild animal populations.

Despite the risks associated with illegal hunting (arrest, payment of fines and imprisonment), revenue generated from wild meat trade is the motivating factor. Local prices for other forms of wild meat could not be determined because of lack of data. Regional estimates could assist in the valuation of wild meat from various species. Others are motivated to engage in illegal hunting to get meat which is a source of protein and some hunt illegally in retaliation to compensate for human–wildlife conflict (damage and loss of agricultural crops).

Historically, the people in the three CCs have been using various methods for illegal hunting of animals. According to Marks (1977) and Lindsey *et al.* (2013), methods that have been used to hunt wildlife for wild meat in African savannah include snares, firearms (muzzle-loading guns), dogs, fire, bows and arrows, gin traps, nets, small mammal and bird traps and pitfall traps. All of these hunting methods are illegal in Zambia (Zambia Wildlife Act, No. 14 of 2015); the use of dogs is legal in Zimbabwe only (Trapping of Animals Act of 2002). The most common methods used in the three conservancies at present include snaring, use of catapult, glue, traps and dogs (Chileshe and Lepiller, 2020). Additionally, the local people also indicated the use of monocrotophos (an organophosphate insecticide) to kill birds by adding the chemical to scarce water drinking points that remain during the dry season. However, according to the Bird Survey Report for the ICC in Kazungula and Mwandi Districts, the extent to which this chemical is used needs further investigation (Chibesa, 2020).

The conservation and protection of wildlife in the three CCs is the responsibility of the governments (Zambia and Zimbabwe) and the local leadership structures (chiefs and village headmen, and councillors). Hunting is regulated by law and one needs to obtain a permit to hunt. Community members who break the laws (both customary and statutory) are punished and sanctions are imposed by authorities. The most lenient sanction is the reminder of the law. Severe sanctions include confiscation of meat, fines and imprisonment. The Zambia Wildlife Act, No. 14 of 2015, Sections 129 and 130, indicates that a person who is in possession of, sells, buys, imports, or exports or attempts to sell, buy, import or export a trophy or meat of a wild animal is liable to a fine of not less than three hundred thousand penalty units or to imprisonment for a term not exceeding seven years, or both. In Zimbabwe, Section 104 (a) of the Parks and Wildlife Act, Chapter 20:14 provides for penalties for the poaching of wild animals, birds and fish through Statutory Instrument 92 of 2009. To complement law enforcement provided by wildlife police officers or rangers employed by the government, communities and local authorities are involved by employing game scouts. In MCC, the community is being assisted by the safari operator in its anti-poaching efforts. However, due to poor funding and lack of resources, carrying out anti-poaching activities is a challenge in all the conservancies. As such, the development of wildlife-based industries such as game bird hunting, avitourism and ecotourism are hindered as wildlife offences are granted much less priority compared to offences involving livestock even though wild animals killed may have a much higher value than livestock (Knapp, 2012; Lindsey *et al.*, 2013; Manyanga and Pangeti, 2017).

C.2. Way forward

The demand for wild meat will continue to grow owing to ever-increasing human population in both rural and urban areas. Poaching and unsustainable wild meat trade contributes to extinction risk of many mammal and bird species. To sustainably manage the wildlife in the three

CCs and to ensure that hunting for wild meat does not put wildlife at risk of extinction, there is need to consider the following:

- providing alternative substitutes for proteins by encouraging communities to start growing plants that are rich in proteins (such as beans and groundnuts) as opposed to engaging in wild meat trade (see Lindsey *et al.*, 2012 for further details); and also providing support for other income generating projects, as it will take time before conservancies start making a profit;
- integrating traditional hunts (trapping) as local measures to reduce crop destruction by birds, rodents and wild pigs;
- providing an alternative source of meat and protein through fish farming, poultry and livestock rearing projects;
- providing alternative sources of income such as arts and crafts that can be sold to tourists visiting the CCs to stop reliance on income from selling wild meat.

According to Ripple *et al.* (2016), other strategies that can be implemented to support sustainable wild meat hunting are increased legal protection for wild animals, empowering the local communities by implementing legal user rights for wildlife utilization so that they can derive benefits, and changing international policies in order to regulate the trade in wild meat and other wildlife products.

D. Recommendations

The recommendations that can be made from the results presented in this chapter are presented below.

D.1. Improve institutional set-up and collaboration

The establishment and capacity building of CC institutions, as central institutional bodies within CCs, is necessary to ensure sustainability and provision of coordinated maintenance support towards operations, including infrastructure – roads, fireguards, accommodation and water facilities in the CCs. In addition, CCs provide a way to further decentralize the management of natural resources to the local level. This calls for additional investments towards institutional development and training, to ensure sound management of funds and enhance transparency in revenue distribution.

D.2. Provide alternative livelihoods

There is a potential for the communities in the three CCs to generate income from wildlife-based enterprises. However, the wildlife population across the three CCS is currently low and restocking is recommended as this would increase species diversity and richness. Both trophy hunting and photographic tourism are viable across these areas. However, extensive marketing would be required for these enterprises to generate a significant income. The CCs can be supported in creating new markets for local products, increasing benefits derived by communities from the tourism value chain.

D.3. Enhancing community anti-poaching

Poaching activities are rampant across the CCs. Therefore, restocking exercises should be preceded by effective and well-coordinated law enforcement and anti-poaching efforts. The SWM Programme in KaZa should ensure that adequate law enforcement staff is recruited and trained, and that a robust law enforcement system is put in place before the restocking exercise is conducted. It is proposed that a scout density of 1 man/30 or 40 km² be considered.

D.4. Support for alternative sources of protein

It is clear that the demand for wild meat keeps growing in step with the ever-increasing human population in both rural and urban areas. Development of the CCs offers new opportunities for alternative substitutes for protein, for example, through actions aimed at broadening the base for protein from both animal and plant species, as well as dedicated support towards organic fish farming, and organized poultry and livestock production.

Overall, the CCs, with the support of the SWM Programme in KaZa and responsible authorities, should adopt several business models that can be adapted to each context to support revenue generating enterprises for conservation and community development.

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Summary

In the three community conservancies (CCs) involved in the SWM Programme in KaZa, fish is of great importance, mainly as an alternative source of protein to wild meat. Processed fish, which is produced mainly by sun-drying and hot-smoking, plays a crucial role in providing an alternative protein source to fresh fish, especially in the most remote areas where cold storage facilities are often lacking This chapter presents the findings made during the various studies, missions and surveys carried out in the framework of the SWM Programme in KaZa, focusing on fish and fisheries systems. On the banks, sustainable fishing practices are not followed, according to findings and discussions with fishers, resulting in reduced quantities as well as size of fish. In other areas, perennial water resources are absent, making fish farming activities difficult. Proposals are developed to provide the missing link, i.e. water, which could sustainably increase farming and fishing practices. With regards to fish processing, the introduction of improved equipment is not a current option due to the socioeconomic context characterized by high poverty levels, small scale of production and lack of professional organization but practice improvements and local capacity building are recommended.

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VI. THE FISHING SYSTEM

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Introduction

The objective of this chapter is, on the one hand, to summarize the observations made in the field of fisheries during the first years of the SWM Programme in KaZa and, on the other hand, to make proposals regarding the potential ways of developing aquaculture production and having sustainable and improved fishing practices in the CCs of the KaZa site. This chapter is part of the Result 3 "Alternative Proteins" of the SWM Programme and tries to develop innovative ways to improve fish resource access, in agreement with the theory of change of the SWM Programme in KaZa (see Chapter II). To achieve this objective, the chapter is organized into four main parts:

- water availability in the CCs of the KaZa site and hydrographic studies highlighting the possibilities of access to the water resource;
- access to fish in areas where water is present on a perennial basis (fishing and aquaculture) and in areas where the water resource is lacking (aquaculture);
- fish processing (practices diagnosis and processing improvements); and
- lessons learned and recommendations.

Materials and methods

The context of the area in terms of fish catching and/or production and preservation was assessed through the following activities:

- A comprehensive analysis of previous projects, studies and publications allowed the authors to consider different approaches to the sustainability of fish production, capture and processing.
- Meetings with national and local authorities directed the authors to a number of fish farmers, fishermen and fish processors. Interviews with these actors allowed a better understanding of the communities' expectations in technical and economic terms, to assess the sustainability of their production activity in the long term.
- Field missions were carried out to study hydrological trends based on time series analysis of remotely sensed images, examination of secondary data sources, and water quality analyses.

A. Water accessibility

A.1. Access to the water in the CCs

In relation to the production or capture of fish, the three CCs of the SWM Programme in KaZa could be defined according to their availability of and access to water. Water is a scarce resource in this region, except near the Zambezi River. It is possible to distinguish the CCs according to the aspects mentioned below:

- Simalaha CC (Zambia): in this CC, close to the Zambezi River, with constant access to water, fishing and aquaculture activities are developed. The main issues raised are the sustainability of fishing and aquaculture practices for which sustainability issues and their causes differ.
- Inyasemu CC (Zambia) and Mucheni CC (Zimbabwe): in both CCs, water is a scarce resource. During the rainy season, water is lost because it is not particularly easy to capture, and, during the dry season, water is scarce for humans, livestock and wildlife. This often leads to convergence of humans and animals for the same scarce water bodies, thus increasing conflicts between humans and wildlife. It is necessary to have the means to capture water before it is lost in order to increase the availability of water during the dry season. In these CCs, the main problem is how to capture, conserve and manage water.

In both Zambia and Zimbabwe, fish imports are relatively low and cannot be considered sufficient for human consumption. During the early years of the SWM Programme in KaZa, work on the fish farming system focused on understanding these different contexts and proposing innovative approaches to increase fish production and conservation.

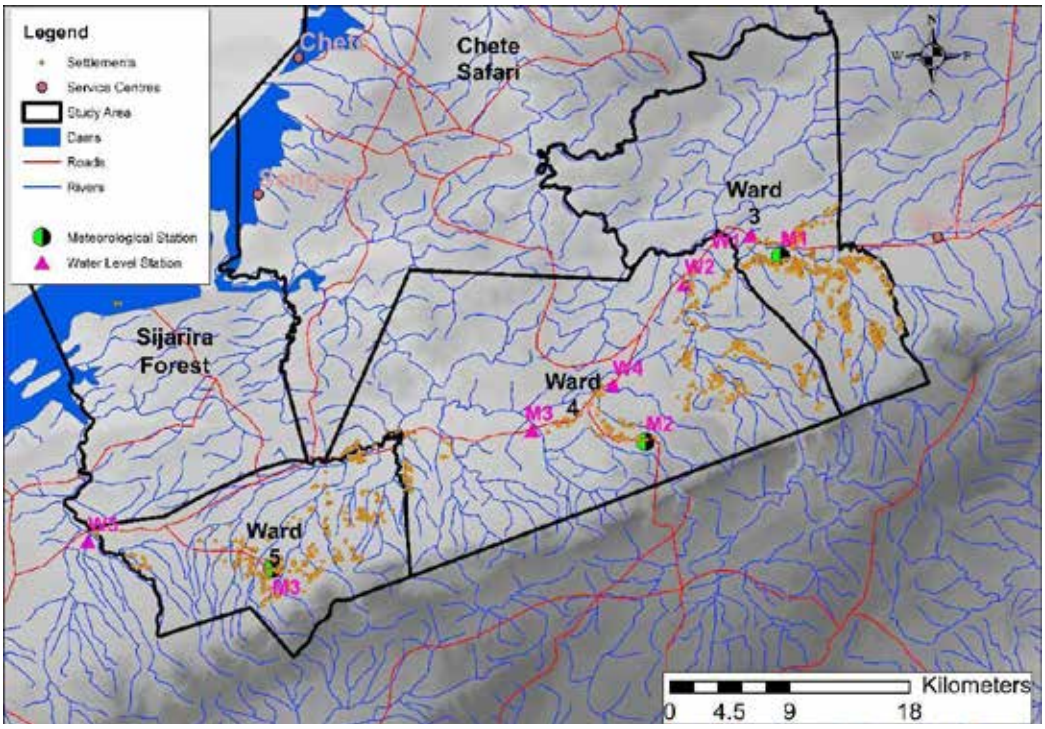

Figure VI.1: Hydrographic network in the Mucheni CC (*Source:* Dzvairo, 2019).

A.2. Hydrological studies

In order to develop fish farming and propose potential areas for the development of hydrological infrastructure, it is essential to know how the hydrological system is developed. In this context, hydrological studies have been carried out in two CCs: Mucheni in Zimbabwe and Inyasemu in Zambia, where water availability is particularly low. The following were the main objectives of the hydrological studies:

- to characterize the hydrological status of specific areas, current water uses and associated threats to the sustainability of water and water-dependent livelihoods and systems;
- to identify potential areas for the development of hydrological infrastructure and the conservation of natural hydrological features for sustainability of the livelihood activities of local communities; and
- to propose a protocol to local communities for reliable monitoring of the hydrological network for the establishment of a hydrological information management system (HIMS).

Hydrological studies provide the opportunity to target areas where boreholes and dams could be constructed to increase people's access to water without affecting other water systems (Figure VI.1).

In addition to the immediate needs, the following main recommendations will contribute to mitigate water-related constraints:

- drilling community wells for domestic water use and developing skills by providing training to some of the community members for well operation and maintenance;
- harnessing spring water in large reservoirs with a steady flow;
- developing fish farming as an alternative source of livelihoods in the area;
- invoking a sense of water stewardship within communities through the formation of river management committees and water user associations;
- raising awareness about the causes of water resource (river) degradation and adopting best practices in deep water conservation;
- enlightening the community on the principles of integrated water resource management as a basis for best practices in water resource management; and
- introducing communities to rainwater harvesting technologies that can help to mitigate water stress (dam construction, etc.).

B. Fish access

B.1. Permanent water availability areas (Simalaha CC)

B.1.1. Fish capture

The districts of Mwandi and Kazungula, which constitute the Upper Zambezi under the Inyasemu and Simalaha CCs, have 18 and 10 fishing camps, respectively, with about 1 125 fishers, 600 plank boats (locally known as *mikolo*) and 50 fiberglass boats. Mainly permanent, these camps are often flooded during the rainy season and must be abandoned, until water levels have fallen. This coincides with the fishing ban (1 December–28 February).

All the 28 fishing villages have at least one locally recognized landing site. Fish marketing is such that by the time the fishers set their nets, they have already received from traders either cash or payment in kind (food, clothing, fishing nets and even, in rare cases, boats); only a few fishers sell their catch in cash. The fish market normally has a large number of buyers. It is not entirely certain if fishers make a profit. Most buyers have formed a committee called the Fish Mongers Association and are based in Livingstone, where they are generally fish traders. In addition, five permanent lagoons in the Upper Zambezi region are designated as breeding areas managed by the customary authorities. They will soon be closed to fishing as they will be dedicated solely to fish breeding.

The fishery resource is managed by the community leaders and the Village Fisheries Management Committees (VFMCs) which monitor aquaculture development in the Fisheries Management Area under their jurisdiction and refer to the Zambian Department of Fisheries (DoF). Fishers must follow very strict net regulations. This is part of the DoF's objectives, to develop these breeding and safety zones to revive the declining fish resource. A significant reduction in the fish population was indeed observed in the Zambezi River at the time of the survey, either because there was an overall reduction in the fish resource due to low rainfall, or because the number of fishers has increased (meaning a reduction in catch per fisher without an overall reduction), or both. Some fishers pointed out that the fish reproduction was also not adequate, which could be partly explained by the low flood of 2019, which led to a reduction in the breeding grounds for fish. Overall, the main reasons behind this reduction in fishery resources could be an increase in the number of fishers and/or a reduction in fish spawning areas and in the floodplain, but also an increase in catches by unauthorized methods (Figure VI.2).

The number of fishers, which has increased over the last decades (20 percent of fishers arrived in the last five years in a village visited), is evidence that the income from fishing in the region is certainly higher than income from other sectors such as agriculture. The transboundary context

Figure VI.2: Forbidden mosquito net in the Zambezi River (©CIRAD/H. de Verdal)

of the Zambezi River (shared among Botswana, Mozambique, Namibia, Zambia and Zimbabwe) is complex and is not in favour of innovations to increase fish production in the river, as Zambian fishers consider that fishers from other countries should not catch "Zambian" fish. Furthermore, they do not agree to develop sanctuaries where fish could reproduce, as they fear that the larvae and fry could shift to other parts of the river. Nevertheless, they do not hesitate to fish on the Namibian side of the river, where the number of fishers is smaller and the quantity of fish higher.

If the official national ban makes the fishers aware of the link between capture and fish reproduction, it is not always adapted to local contexts and the fishers often continue fishing for their daily subsistence and/or trading at low values. Fishing sustainably during this period, i.e. respecting the overall dynamics of fish resources, could be considered for this purpose; however, the sale of fish is officially prohibited during the ban, which creates a good opportunity for farmed fish.

Improving fish breeding and designing new rules adapted to each specific context are key areas to sustain fish capture that the SWM Programme in KaZa is promoting. To prohibit fishing activities in specific areas known to fishers as being breeding areas in order to maintain fish breeding should be considered, as well as guarding against the danger of the larvae and fry being released into the surrounding waters and protecting them from illegal fishing activities or predators like crocodiles. It could also be envisaged to authorize, under certain conditions, the capture of fish species that are not subject to global conservation, and to target certain lagoons or areas of water closed off from the river, where fertilization with cow manure or feeding with maize or rice bran could improve natural productivity and increase the quantity of fish produced.

Such improvements involve an understanding of how able the local communities are to put effective rules in place to protect these areas and share the harvested fish through working in collaboration with customary authorities as well as official services.

B.1.2. Aquaculture

Field visits, discussions and economic analyses operated by the SWM KaZa team show that fish farming activities were not economically viable because production costs were higher than profits. Many funded aquatic ponds have closed; the empty ponds were only operational for the duration of funding. Active fish farmers use gas-driven pumps, usually paid for with former projects' funds, but gas is expensive and pumps can break, with no skill to repair them; solar pumps, though more expensive, could be an alternative. In addition, the sandy soil in this flood zone imposes a dam lining to develop the fish ponds, which is also an expensive solution as plastics generally do not last more than one year. The consequent leakages increase the use of pumps, and therefore the costs, with no positive outcome. Overall, the fish farms are embedded in an integrated system where the fish farmers buy fry and feed from the DoF, which clearly tends towards the fish farming system without a real willingness to adapt its vision to the context. As a consequence, this system with pump, fry and pellet feed makes fish very expensive to produce and sell, and aquaculture is not sustainable in the long term. To develop alternative feeding systems with organic fertilization or a mixture of manure and pellets could benefit the fish farmers, but there is a lack of a network to discuss these innovative techniques.

The priorities of the SWM Programme in KaZa are based on the following simple principles:

- Integrated production systems to reduce the average cost of production and to maximize profitability. Another type of production system could optimize resource consumption,

like integrating livestock or crops into the farming system to reduce feed costs. Such a combination allows the pump to irrigate the garden while also filling the pond, and reduces the investment cost for irrigation equipment.

- Development of farmers' organizations and skills through capacity building and establishment of sustainable networks to provide inputs (fry, broodstock) or consultation.
- Improved accessibility of fry, whose high price is linked to a low survival rate (between 20 and 50 percent), while fry production is profitable in the western and southern provinces of Zambia.

In these conditions, fish farming along the river with a production cost higher than USD 2/kg is not sustainable. Extensive small fish farms appear not to be an appropriate option in this area, thus the SWM Programme in KaZa intends to develop systems based on seasonal ponds, such as in lagoons after floodplains, that also could be used for fishing during the ban.

B.2. Restricted water availability areas (Mucheni CC and Inyasemu CC)

In Inyasemu CC (Zambia) and Mucheni CC (Zimbabwe), scarce water resources are the main constraints to livestock and productive garden development. Some personal or community initiatives are being taken to construct dams and ponds which are used to hold water during the rainy season and to provide water to people and livestock as long as possible. Some springs in the Chizarira mountain close to Mucheni CC give a steady flow to the Mucheni River and its tributaries, but this water disappears underground a few kilometres from the foot of the mountain range. Fishing is consequently not an option, except in a few small rivers where fishing activities can take place at the end of the rainy season, from about February to April (such as the Sichifulo River in the Inyasemu Game Management Area in Zambia). To increase water availability, it has been proposed to construct large dams and boreholes to reach the water table, or to build small dykes across a drainage channel or in the bottom of a valley; harnessing spring water could be another option. Such innovations have been made possible with the intervention of the NGO CARE (in Inyasemu CC) and government programs (in Mucheni CC). During the dry season, many of these water points dry up and farmers have to migrate in search of water for their livestock. Growing crops or fishing is not the way to increase livelihoods, but rather it serves as a means to ensure the resilience of the agricultural system. In such areas, the main challenges are the management of extreme rainfall to prevent floods and the harvesting of rainwater to maintain water supplies, and then the lack of water for people, livestock and wildlife with an increase in human–wildlife conflicts.

The ways forward for the SWM Programme in KaZa are described in the next sections.

B.2.1. Seasonal ponds development

In these regions where water is scarce and not perennial, there are, to the authors' knowledge, no real fish farms established so far. Except in the rare places where the springs benefit from groundwater, it is not possible to dig ponds that will store the water all year round without the need for pumping. In this context, the main approach is to take the seasonality of water into account. This seasonal water is important at the end of the rainy season and the challenge in designing a new model of fish farming could be to allow fish farmers to enhance their fish production capacity. Farmers desire to develop water bodies that will easily conserve water seasonally and, if possible, throughout the year. Community and individual initiatives have been noted (Figure VI.3).

Figure VI.3: Dam built by the village community to catch and store seasonal water in Nyawa Chiefdom, Zambia (©CIRAD/H. de Verdal)

B.2.2. Extensive and community fish farming

Trying to set up fish production based on the natural productivity of the pond is a reliable option because the cost of feed is not significant. Moreover, the development of extensive fish farming activities would reduce the production costs to less than USD 2/kg, which would allow fish farmers to make a profit. It could be interesting to promote such an approach where construction of innovative systems valorizing the fish resource in agricultural water bodies is put in place. Some groups have shown interest in such farming systems: in Inyasemu CC, a group of women is willing to install a network of small tanks near the wells to conserve broodstock during the dry season. The possibility of producing fry in these reservoirs should be tested to improve the loading of the pond dams. All the motivated smallholders, both male and female, are willing to work with such a project in order to set up a system capable of producing fish that can be sold at USD 2/kg. As a quantitative objective, a net production (the difference in weight between harvested and stocked fish) of 500 kg/ha/year seems achievable. This co-construction process must be iterative and should last three to four years in order to find a set of techniques well adapted to the environment. For example, the appropriate techniques to keep the spawning fish alive in small ponds and to maintain them in good condition are not yet defined.

B.2.3. Need for technical advice

A field officer capable of leading the dam co-construction process is necessary. He or she should have several skills such as the ability to understand and motivate people, group leadership and field training. He/she should be supported by a team of experts providing methodological

and technical advice. It would be useful to employ some interns (mixing international students and Zambian/Zimbabwean students from colleges and universities) to better evaluate the ongoing process. At the institutional level, an environment needs to be established where open discussions including customary authorities on the one hand and official services on the other can be held. In addition, it seems important to carry out a technical evaluation of dams that have already been built (for example, in Zambia by the Technical Services Branch [TSB] which is a service shared between the Ministry of Livestock and Fisheries and the Ministry of Agriculture). This would allow the dams to be evaluated and ensure that they are in line with the beneficiaries' objectives. In the Mucheni CC, it was important to carry out a technical assessment of the flow of natural springs and to find ways to store the water before it disappears into the ground (Kalahari sands) some few kilometres from the Chizarira Mountains (Pender and Rosenberg, 1995). The harvested water can be used for integrated fish–animal–horticultural production.

The SWM Programme in KaZa will be involved in a pilot programme using a few seasonal ponds in areas with limited water availability in order to highlight the possibilities and constraints of these aquaculture systems. This programme is divided into six steps: (i) identification of the beneficiaries (small owner or community with seasonal ponds); (ii) design of plans on how to find fish and transport them to the beneficiaries' farms; (iii) storage of fish in the targeted seasonal ponds; (iv) training of beneficiaries on the main actions required for the aquaculture process; (v) discussion with the beneficiaries on the next steps and on their requests and attempts; and (vi) evaluation of the opportunities and constraints for the beneficiaries of this activity. The process of co-developing new fish farming systems with local beneficiaries will lead to the design of farming systems that are profitable and manageable without the support of external actors.

C. Fish processing and marketing

C.1. Key results

C.1.1. Current fish processing practices in Zambia

C.1.1.1. Fish processing stakeholders

Meetings with stakeholders involved in the fish processing sector were held in three villages/fishing camps along the Zambezi River (Musulekwa village, Yoelo fishing camp and Kabulang'osi village). The distinction between village and camp was based on the fact that, in camps, fish processors leave when they have enough processed fish to sell and do not necessarily return. Fish for processing is captured or brought to fishers from the same village/camp. Fish processors leave to sell processed fish in Livingstone but could go as far as Choma or Lusaka, the capital city.

In Niawa Chiefdom (Inyasemu CC), fish processing activities are limited to the rainy season when the Sichifulo River flows; therefore, they were not observed during the field visit. The authors were told that people from and outside Nyawa fish and process fish to sell it as far as Democratic Republic of the Congo some hundreds of kilometres away. Among the dried fish sellers met in markets of some villages, one in Nyawa was a fisher selling the fish he processed himself over 150 km from the market. This information is in accordance with a market survey conducted in Katima Mulilo (which is across the river from the Zambian sites of the SWM Programme in KaZa

Figure VI.4: Smoking ovens at Kabulang'ozi fishing camp in Yeta Chiefdom (©CIRAD/E. Arnaud)

along the Zambezi River) during a previous project (Simasiku *et al.*, 2018). This survey showed that dried fish vendors (all women) were travelling to fishing villages in the floodplain for a week or two to buy fresh fish and process it on site.

Fish processors are individuals and there is no processor organization or collaborative dynamics among different processors. The labour involved in firewood collection appears to be the main reason. In the areas visited, there is no fish processing company nor association of producers or processing plants even at a small scale for collaborative initiatives.

C.1.1.2. Amounts of fish processed

There are a huge number of processors (about as many as there are households), each processing small amounts of fish (often a few kg/day). It is thus impossible to estimate at this stage the quantity of fish processed in the Zambian sites of the SWM Programme in KaZa. However, it is reported that 65 percent of fish production is smoked or dried in Zambia (FAO, 2006). The proportion of processed fish is highest in the seasonal fishing camp of Nyawa (95 percent of fish are said to be processed) and it is assumed to be the same in the other remote areas of Yoelo and Kabulang'osi along the Zambezi River. This is due to the lack of a cold chain system and the absence of fish traders who come to buy fresh fish and transport it on ice boxes as observed in Musulekwa.

C.1.1.3. Processing methods

Processing is carried out on captured fish: barbel fish/catfish (*Clarias spp*.), breams tilapia (*Oreochromis spp.*) and silver fish (unknown species) in Nyawa Chiefdom. In processing, fish is mainly eviscerated and split dorsally. Catfish are processed whole but are destined for export to

Democratic Republic of the Congo. The processing techniques include mainly hot-smoking and sun-drying. Salting, which is usually used as a preceding step before drying/smoking, does not seem to be common in the Zambian sites of the SWM Programme in KaZa, though people declare that they are aware that salt can be used, which can be explained by some supply issues and consumer preferences. Sun-drying and hot-smoking might be used in combination, without making a distinction between dried and smoked fish. Smoking might be linked to the presence of cooking fires in the kitchen where fish is stored overnight. It also could be used during cloudy/rainy days when sun-drying is not possible. The duration reported for the sun-drying and hot-smoking is highly variable as it depends on the weather and the way they are combined. The durations could not be precisely verified but generally it was reported to be three to five days for sun-drying and a few hours to one day for hot-smoking. Processing is done with basic equipment such as direct smoking ovens (Figure VI.4), sun-drying on rocks or drying racks in the open air (Figure VI.5).

C.1.1.4. Yields/shelf life/prices

The moisture content of processed fish bought in Nyawa village markets was estimated to be 10–15 percent. A high level of dryness during processing thus seems expected. The processing yield could therefore be estimated at about one-third of fresh fish.

Both hot-smoking and sun-drying extend the shelf life of fish by decreasing the moisture content, with hot-smoking allowing faster removal of water compared to sun-drying. Depending on the extent of water removal, fish can be stored for a few days to a few months for the most-dried products (fish with 10 to 20 percent moisture content).

Processed fish is sold at USD 6/kg, which is equivalent to USD 2/kg of fresh fish considering the weight loss during processing. Whereas the price of fresh fish, whether imported, caught from the river or produced at a farm through aquaculture, is twice that (around USD 4/kg), except along the river side where fresh fish can be sold at USD 1/kg. Hence, it is more profitable to sell the fresh fish in markets farther from the river at USD 4/kg. This explains why fish is only processed where people cannot sell it fresh.

Processed fish is an essential source of protein, especially on markets far from fresh fish production areas. Post-harvest processing plays a crucial role, especially when fish is not sold fresh or consumed soon after the capture. It avoids physical losses of fish because all the considered fishing areas in the CCs are far from the markets and cold storage facilities are generally lacking. Fish processing also allows fishers to keep the fish caught for their own consumption during the fishing ban.

Figure VI.5: Fish being sun-dried at Kabulang'ozi fishing camp in Yeta Chiefdom (©CIRAD/H. de Verdal)

C.1.1.5. Challenges and identified risks

Health hazards for consumers can result from inadequate practices and bad weather conditions during the processing steps. The following sanitary quality defects can be found in processed fish:

- bad microbiological quality;
- biogenic amines and toxins from pathogenic bacteria; and
- excessive content of carcinogenic polycyclic aromatic hydrocarbons (PAHs) due to the smoking equipment used, the long processing time required and the lack of knowledge about good practices regarding drying and hot-smoking.

Many constraints linked to fish processing have been identified, as follows:

- The processing only by smoking on direct fire ovens/kilns should be avoided (high PAH hazards).
- The use of charcoal is not an option due to its high cost, which most of the fish processors cannot afford.
- Wood consumption should be reduced. Wood collection and availability was often cited as the major challenge for fish processors along with the scarcity of fish.
- Processing is done on a very small scale, mostly by individuals or at the household level. There is no presence of fish processing companies, associations of producers or even a small processing unit/site for collaborative initiatives in the Simalaha CC. There are, rather, many processors, with each of them processing small amounts of fish (often a few kg/day). The absence of an organization of processors makes the actualization of economies of scale and the implementation of efficient technologies difficult.
- There is no fish processing technical centre for capacity building of fishers in the area.
- The stakeholders have no investment capacity.

C.1.2. Evaluation of improved fish processes available in other countries in the context of the KaZa sites

The potential of improved equipment/methods for hot-smoking and sun-drying fish in the context of the Zambian sites of the SWM Programme in KaZa was assessed. Their potential to overcome some of the challenges identified is summarized in Table VI.1.

Table VI.1: Pros and cons of several fish hot-smoking and sun-drying equipment or methods

Smoking ovens	Adapted to small quantity of fish	Allows concomitant drying and smoking	Requires charcoal	PAH reduction
Chorkor (Bomfeh *et al.*, 2019)	-	+	-	-
Systems with deported fire (Gret, 1993)	+	-	-	+
FTT-Thiaroye (Ndiaye *et al.*, 2015)	-	+	+	+
WorldFish oven (Kwofie *et al.*, 2019)	+	+	-	unknown
Radiant plate smoker (Ekomy *et al.*, 2013)	-	+/ -	-	+
Succession of charcoal and wood in traditional ovens	+	+	+	+
Sun-drying equipment	Adapted to small quantity of fish	Subject to bad weather and dust insects		
Kiraye CEAS (solar drying)	-	-		

C.2. Way forward

Fish processing does not lead to physical fish loss. However, fish loss should be assessed when fishing is at its highest level and for a short time in some fishing camps. Processing might also be necessary if there is a large production of fish through aquaculture. Moreover, the authorities should be warned that some processing practices may lead to production of harmful substances, such as microbial toxins and potential PAHs. Improved fish processing equipment would make it easier to collect wood, avoid the continuous monitoring of the products during processing, and reduce wood consumption.

Nevertheless, the introduction of any modern smoking and sun-drying equipment or the use of charcoal would not be sustainable due to the current socioeconomic context of the sites of the SWM Programme in KaZa. The low quantities processed per operator, their lack of investment capacity and the absence of a collective organization are the main barriers. Moreover, this improvement would increase the price of the fish due to the investment.

However, there are some recommendations that can easily be implemented by fish processors:

- Reduce hot-smoking time by the implementation of a longer sun-drying when the weather allows it. This would reduce wood consumption and contamination with PAHs.
- Increase the distance between the smoking fish and the fire to prevent the flames from touching the fish during the step of hot-smoking; and use a deported system for the generation of smoke during the phase dedicated to smoke deposition.
- Encourage the use of drying racks for sun-drying.

To be able to go further in the improvement of the processing techniques by the fish processing operators, the following actions would be undertaken in the near future:

- Local capacity building and strengthening: It is essential to develop local capacity in order to upgrade and facilitate the fish processing operators at the technical and entrepreneurial levels. The starting point is a brainstorming and training workshop in Montpellier in 2021 on fish and meat processing taking into account socioeconomic aspects. It is intended for agents of Ministries, technical advisors and academics, with whom future collaborative actions will be launched. This workshop could lead to the redesign of adapted processing practices and equipment.
- Identification and testing with fish processing operator practices to improve processes. By relying on the strengthened local skills network, discussion with the beneficiaries can be organized to define their needs and highlight constraints to be considered in the innovation process. This network will be in charge of:
    - proposing actions such as training of communities and producer organizations that could emerge; and
    - testing of adapted drying and smoking equipment.

D. Lessons learned and recommendations

There is a high degree of variability between the analysed CCs in terms of area, country, context, geography, demography, governance, etc., and therefore it is not easy to understand how decisions are made and what the consequences of their decisions and discussions would be for the direct beneficiaries of the SWM Programme in KaZa.

From this study, three main recommendations can be developed:

- It is important to carry out a fish value chain analysis (including potentially a post-harvest loss assessment). Such an analysis would allow a better understanding of the economic importance of the fishing system, more details on the fish market and trade gap, and actions to increase potential.
- In KaZa region where water is not perennial, the main recommendation is to valorize water with fish when water is available using seasonal ponds at the end of the rainy season. It is also important to think about the integration with the other activities of the household. Furthermore, developing networks of people wanting to try fish farming constitutes a good approach for the SWM Programme. It is also the best way to cope with resistance to change.
- Regarding fish processing, it is important to build local capacity for increased fish production from extensive fish farming. Supporting collaborative dynamics and organizational innovations in the fish processing sector will improve product quality and safety, reduce labour and decrease wood consumption.

Summary

This chapter is part of Result 3 "Supply of alternative protein is improved" of the Sustainable Wildlife Management (SWM) Programme. It reviews and characterizes the livestock production and grazing management systems in the three community conservancies (CCs) of Mucheni in Zimbabwe, and Inyasemu and Simalaha in Zambia, with a view to explore opportunities in the supply of alternative protein to resident communities in agreement with the theory of change of the SWM Programme in KaZa. Information and data were collected through literature reviews, qualitative and quantitative studies and surveys and general observation within the three CCs. The findings reveal that the farmers' major source of livelihood is livestock production with cattle, goats and poultry featuring as predominant species. The production systems are basic, "low input low output".

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VII. THE LIVESTOCK SYSTEM

Frank Chinembiri, Luzibo Munsaka, Maxwell Phiri and Penias Banda

Introduction

Livestock is central to the livelihoods of the inhabitants of the three community conservancies (CCs) of Mucheni in Zimbabwe, Inyasemu and Simalaha in Zambia. The ethnic groups in these conservancies consist of Tonga, Toka-Leya and Lozi groups that are traditionally known as agro-pastoralists (mixed farmers), combining the growing of a mix of crops such as maize and small grains with livestock rearing. They are also known to be hunters, fishers and gatherers of forest products. However, livestock production is central to their culturally rich traditions. The three CCs are characterized by poor, unreliable rainfall and hot temperatures – conditions that are suitable for livestock production and wildlife. The rearing of livestock is practised for multiple purposes. First, for economic purposes, draught power, manure and transport and thus, it is often beyond its nutritional value. Second, livestock also occupies a significant traditional and sociocultural space, as animals are used for ceremonies and rituals, at marriages and funerals. The common livestock owned are cattle, goats, pigs and chickens.

Materials and methods

This chapter relies on a review and analysis of data and information pertaining to the three CCs and most of that was generated through a mixed method approach:

- qualitative and quantitative studies and surveys (baseline surveys, livestock study, hydrological survey and wild meat consumption);
- revisiting of primary and secondary data;
- outcomes of key informant interviews (KII) – for their specialized and expert opinions and views relating to selected variables;
- documented outcomes of focus group discussions (FGD) – where participatory tools had been used to gather both qualitative and quantitative data on specific variables at community level;
- questionnaires – used to collect primary data at household level during baseline survey and studies;
- observations – made during surveys and studies to collect information and qualitative and quantitative data and ground truthing; and
- data collected through interviews, FGD, questionnaires and observations, collected with the agreement of the communities.

A. Local livestock production system and value chains

A.1. Key results

A.1.1. Cattle

The Tonga, Toka-Leya and Lozi people in the three CCs are dependent on livestock and primarily cattle in both good and bad years.

A.1.1.1. Ownership and roles

The studies by the World Food Programme (WFP) in Binga (WFP, 2016) revealed that ownership was much skewed with only 55 percent of the households owning an average of 6–7 head of cattle (Table VII.1) (Munsaka *et al.*, 2020). Also skewed was ownership by gender, where 66 percent of cattle are owned by men, 14 percent by women and 20 percent are dually owned. In both Inyasemu and Simalaha CCs, 90 percent of cattle are owned by men while 10 percent are owned by women – most of whom are female heads of households. However, in both Inyasemu and Simalaha CCs of Zambia, cattle numbers per household range from as high as 150 to 200 head (Ministry of Fisheries and Livestock – MFL, 2019).

Table VII.1: Livestock holding of meat consumption survey households (HH) in two wards of Mucheni CC (*Source:* Authors)

	High income HH		Middle income HH		Low income HH	
	Ward 3	Ward 4	Ward 3	Ward 4	Ward 3	Ward 4
Number of HH	4HH	2HH	2HH	5HH	4HH	3HH
Cattle	3–6	10–16	0	5–10	0–4	0–4
Goat	10–60	12–14	0–10	5–7	0–6	0–4
Sheep	0	6	0	0	2	0
Chicken	5–6	11–20	5–14	0–5	0–5	0–2
Guinea Fowl	1–8	5	0	0–4	0	0

Cattle provide draught power and organic fertilizer in the form of manure into the cropping systems. Cattle are also used for pulling ploughs or logs, for use at home as a source of power, and scotch carts – an invaluable form of transport in these remotely located rural areas where the road network is poorly developed.

Meat, milk, skins and hides are outputs from cattle as in all other smallholder or large-scale livestock production systems. Occasionally, cattle are sold to generate cash especially as a fallback to cushion farmers from the effects of recurring droughts or floods.

Livestock, especially cattle, found in these CCs play critical traditional and cultural roles. These roles include dowry in marriages, appeasement of ancestors and traditional fines.

A.1.1.2. Production system

The majority of cattle in the Mucheni CC are Sanga type. The animals are generally of the local or indigenous breeds of Mashona/Nguni/Nkone extraction, poorly framed and of undesirable

conformation. Common breeds of cattle in both Inyasemu and Simalaha are Tonga and Angoni (local breeds), Brahman, Boran and Sussex (exotic breeds). Farmers also have crossbreeds between Boran and either Tonga or Angoni types. Indigenous breeds are hardy, resistant to ticks and efficient converters of poor-quality feed, for draught power as well as milk and meat production.

Baseline surveys (Le Bel and Usman, 2020) and studies undertaken by the SWM Programme in KaZa and reports from other national livestock institutions like the Department of Livestock and Veterinary Services (DLVS) and Department of Agricultural, Technical and Extension Services (AGRITEX) in Zimbabwe, and the Department of Livestock and Fisheries in Zambia, show that production systems are basic and undeveloped. The production systems in the three conservancies are "low input low output", typical of most smallholder cattle production enterprises. Animal husbandry practices (feeding, breeding, selection, culling and grazing management) and animal health care are also poor. Under these commonly practised traditional cattle raising systems, the standard cattle husbandry practice is herding by day and kraaling or penning at night during the rain/cropping season and free range with limited or occasional kraaling being a common practice, during the dry season.

In general, these animals fend for themselves with no additional supplementary feed provided. In addition to these poor husbandry practices, there are inherent adverse seasonal factors like shortages of grazing and water, disease outbreaks and droughts. The livestock and baseline studies noted in all the three conservancies that increased labour demand in the fields during the cropping season often results in the kraaling of cattle for longer periods of time, impacting negatively on grazing time and subsequently on productivity. Added to that, the cow is required to provide milk for both its calf and the household, which is achieved by separating the cow and calf during the night or even for longer periods. Usually, these cows are not fed any extra feed, prolonging the resumption of normal ovarian activity. This results in extended inter-calving intervals.

This management system, together with the endemic harsh environment (limited grazing, frequent droughts leading to shortages of water and feed), leads to depressed animal productivity. There are also poor animal husbandry practices in terms of selection for breeding and culling for poor performance, and inbreeding leading to poor genetic composition and performance of the livestock population. The low productivity parameters, as measured by calving rates, mortality rates, growth rates, milk production, draught power provision and product quality, are a sum reflection of the suboptimal production environment which is characteristic across all of the three conservancies. For example, an SWM Programme livestock study in Mucheni CC by Chinembiri (2019) estimated calving rates at 55 percent compared to a desirable minimum of 70–75 percent; mortality rates range between 6–8 percent compared to the desired rate of below 3 percent per annum; offtake rate averages 6.5 percent compared to an achievable rate of 15–20 percent from commercially run systems. The same study showed that herd compositions pointed to a rapidly increasing herd with an annual recruitment of 22 percent heifers into the female breeding herd against a standard of 10–12 percent. Further analyses of the herd composition reflected that the system was offloading most of the males and retaining females most likely beyond their reproductive age. This herd growth is against reduced grazing area and quality due to unplanned new settlements in the areas, depressed water supplies and unorganized market outlets.

While cattle have a great potential to make a significant contribution to food, nutrition and income security in the three CCs, disease outbreaks present an additional challenge. In

particular, irregular dipping due to shortages of acaricide (dipping chemicals), insufficient disease control infrastructure (spray races or dip tanks), scarce water resources and limited mobility by veterinary technical staff are some of the major constraints affecting livestock production. The most common tick-borne diseases reported are anaplasmosis, heartwater and redwater. Also, dermatophylosis (*senkobo*) and lumpy skin are cause for concern. Due to proximity to wildlife from the national parks (NPs) and game management areas (GMAs) there are increased incidences of Foot-and-Mouth Disease (FMD), Black Leg and Corridor disease affecting cattle in Inyasemu and Simalaha CCs.

There is huge potential to increase productivity and production of the cattle herd in the CCs to be tapped into to address and raise community livelihoods and reduce human–wildlife conflicts in the conservancies. Improved common pool resource management coupled with community capacity building is a desirable precursor to sustainable inflows of income, meat, milk, draught power, reduced human–wildlife conflict and wildlife poaching. This change and reorientation of the community vision as espoused by the SWM Programme in KaZa in its theory of change in terms of land-use planning and management is a ''win–win" scenario for both wildlife management and humans. Central to these positive and desirable changes is community mindset change to embrace and appreciate the beneficial concept of human–wildlife cohabitation and livestock commercialization as the centrepiece of development.

A.1.2. Small ruminants

Goat ownership is second only to poultry with up to 80 percent of households owning goats. Ownership ranges between 6–15 goats per household. There are a few cases of farmers owning up to 100 plus goats. In Inyasemu and Simalaha CCs, these small ruminants are mainly owned by women and youths (90 percent) and 10 percent by men. Goats, primarily, and sheep are a major source of ready meat and cash among the people in the three CCs. The dominant goat in Mucheni is the indigenous small-framed *mashona* (similar to the small East African goat) (Chinembiri, 2019; Figure VII.1) while the common breeds of goats in Inyasemu and Simalaha CCs are the local breeds (commonly referred to as *tupongo twa chiTonga*) (Banda *et al*., 2019) dressing out at 6-10 kg at slaughter. The market indications and commercialization dictate that the goat be bigger framed and able to yield carcasses of 15 kg upwards at 12 months (Chinembiri, 2019). Only a small proportion of goats in the CCs attain this weight albeit at over two years. These local indigenous goats are hardy and fertile, achieving kidding rates of up to 70 percent under the harsh environment in the conservancies. With improved management, kidding rates of up to 150 percent can be easily attained. They are the most adaptable to the aforementioned areas as they can survive droughts better and in numbers enough to recover more rapidly after droughts due to inherent fertility, prolificacy and short reproductive cycle. However, a critical analysis of the management systems reveals that management levels of the goat flocks in the areas are still very low. Selection, culling and breeding practices are still very basic and are rarely accorded any attention. Changing the environment through proper and technically climate-smart proven management practices would immensely improve goat productivity. Ecologically, goats are primarily browsers, making good use of the browsable *Mopane*, *Terminalia* and *Grewia* species and thorny bush predominant in the three landscapes. Goats and sheep are small ruminants and do not wander far from homesteads in search of grazing and browsing compared to cattle. In this regard they often stray and often destroy farmers' crops. Goats are kept in goat houses or pens during the night and released for browsing during the day.

Figure VII.1: Typical goats found in Mucheni CC (©F. Chinembiri)

Mortality is estimated at 20–25 percent. Mortality and/or morbidity results from diseases like heartwater, mange, helminths, undernourishment, disappearances, accidents, thefts and predation. Added to that, housing remains unimproved and rudimentary, exposing animals to other diseases and predators. It is a requisite that certain minimum technical requirements like housing meet certain minimum standards in terms of space, ventilation and protection from weather vagaries and predators. Goat offtake is estimated at 21 percent and the majority of this offtake (62 percent) is for home consumption with the balance sold locally or bartered for grain, except for occasional marketing to urban centres.

As indicated above goats are ecologically adaptable to the harsh environment prevailing in the CCs. They are hardy and prolific breeders with short reproductive cycles. These characteristics together with low start-up costs position goats as ideal for quickly supporting poor members of the communities.

A.1.3. Poultry

Poultry keeping is very important to households across all the CCs. Indigenous poultry is the most populous and widely owned domestic animal with up to 90–95 percent of households owning poultry (Chinembiri, 2019). Poultry is kept by both male and female farmers, 80 percent owned by females, with the balance of 20 percent owned by youths and male farmers. In general, poultry free range by day and are enclosed into poorly-built chicken coops while some birds perch up in trees overnight. Apart from the birds scavenging, some farmers provide their indigenous poultry with cereal grain that is not suitable for human consumption, as well as

kitchen waste. Water provision is rarely provided as chickens often survive on kitchen waste water. Chickens are used as a ready and regular supplier of eggs and meat for household consumption or sale. They are of particular importance in poorer families. Poultry numbers in these areas are difficult to estimate but flock sizes per household are 10 to 15 birds. In addition, ducks, pigeons, guinea fowls and turkeys are also kept by a small number of farmers. These flock sizes are dynamic due to frequent Newcastle disease (ND) outbreaks and subsequent fast regenerative capacity of the birds after catastrophic ND outbreaks.

The livestock study (Chinembiri, 2019) in Mucheni CC found indigenous chicken production to be quite adaptable to smallholder production systems, as it takes advantage of the local available resources with minimum management input. The chickens, on average, produced 30–40 eggs from 2.7–3.0 clutches per year. These values, together with the estimates of 50–65 percent hatchability, are well within the range of values for indigenous chickens in the three conservancies.

The system could also be easily integrated into the overall smallholder production system since it does not require much land. In view of climate change, free range chicken production is a sustainable system to produce meat and eggs. The system is environmentally friendly because some chicken litter can be used to support cropping. Also noted was the fact that the initial input or restocking costs are reasonable by any standard while the laying birds have the capacity to be productive within a short period of only five to six months. Indigenous poultry is easily disposable as a ready source of protein and cash. However, the quantification of the income from poultry is still largely unknown.

The productivity of poultry enterprise in Mucheni CC is compromised by high mortalities due to a wide range of factors like poor provision of water, diseases (ND, fowl pox, coccidiosis and internal parasites), and poor housing which exposes chickens (especially chicks) to other diseases (e.g. infectious coryza and pneumonia). Similarly, common diseases in Inyasemu and Simalaha CCs are Gumboro disease, ND and salmonellosis which also depress productivity. Chick mortality is very high, estimated at 64 percent.

With proper management, creation of markets and extension support to curb mortality, and improvement in provision of basic housing and water, indigenous chicken and guinea fowls have the potential to sustainably contribute to the livelihoods and nutritional status of the livestock keepers, without any competition for the ever-decreasing grazing resources within a short period. Guinea fowls occupy a special niche in the hotel and tourism industry as a special poultry meat. Development of this value chain could take advantage of the tourism industry in Livingstone, Victoria Falls, Hwange and Binga business centres.

A.1.4. Other livestock species

The other livestock types kept by the households in conservancies are donkeys and pigs. Because of the apparent ability of donkeys to survive disease outbreaks and droughts better than cattle, they are increasingly becoming an important alternative and, in some cases, the only source of draught animal power especially for the poor subsistence farmers. Donkeys are left to fend for themselves and are hardly cared for and culturally associated with poverty stigma, while owning cattle is seen as a sign of wealth.

In Mucheni CC a few people keep the hardy local species of pigs for domestic meat consumption

and limited local live sales. Usually, pigs are allowed to free range, and scavenge and dig up roots for food around the village and adjacent areas. During the rainy season the pigs are penned and fed a variety of greens. These animals also get household leftovers, vegetable waste, arable crop waste and cereal by-products of brewing (sorghum and millet) when available as supplementary feeds. However, it has been noted that these animals are able to withstand long periods of nutritional deprivation caused by season, drought, and lack of capital and poor management. There are taboos around consumption of pork in Simalaha and Inyasemu, which limit the rearing of pigs. Empirical statistics on production parameters are not available or known. However, because pigs are litter-bearing species with a relatively short gestation period, their potential for meat production far exceeds other species like goats and cattle.

A.2. Way forward

There is a huge observed gap between current productivity levels and potential from community resource endowment, especially small stock (goats and poultry), thus creating a window of opportunity for improvement in the production of livestock and livestock products. Some of these are envisaged under the SWM Programme's direct support and/or partnerships with the private sector companies. These include:

- promotion and adoption of new and available climate-smart technologies like multispecies utilization of the landscape and land-use planning and management;
- appropriate livestock "kraals" and houses to manage and control human–wildlife conflicts for economically sustainable coexistence among humans, livestock and wildlife;
- community mindset change to commercially oriented production anchored in private sector and market development;
- improved production and productivity through extension support, breed improvement and technically sound animal husbandry practices (e.g. housing, feeding systems and animal health care);
- introduction and promotion of appropriate new technologies like animal housing, fencing and wildlife corridors with a view to manage human–wildlife conflicts.

B. Grazing and land use

B.1. Key results

B.1.1. An overview of the vegetation

As earlier pointed out, the conservancies fall under marginal rainfall areas classified as Natural Regions IV and V in Zimbabwe and Agroecological Zone 1 for Zambia. The vegetation is predominantly miombo woodland and savannah, mopane woodland and savannah, and bush savannah and bush thickets. *Mopane*, *Terminalia, Combretum* and *Acacia* species are the dominant and major woody species with some pockets of *Brachystegia* and *Julbernardia*, and *Vachellia* species. Common grass species are annuals of low biomass production but relatively good digestibility and nutritional value. Species from the genera *Aristida, Heteropogon, Andropogon*, *Chloris, Digitaria, Brachiaria* and *Eragrostis* are the common grasses. Thus, the

veld is generally "sweet-veld" comprising browsable tree species and annual grasses relatively rich in protein and of good digestibility. This type of vegetation is ideal for a diversity of herbivore species (grazers and browsers) of different sizes and dietary requirements as they make greater use of the available forage than a monospecies system. With some wildlife and goats primarily browsers and cattle primarily grazers, this natural mix of woody and herbaceous plants tallies very well with the SWM Programme approach to management of the grazing resource, which promotes planned and integrated multispecies utilization of the landscape.

B.1.2. Spatial and temporal distribution of grazing

During the wet season (October–November to March) the vegetation is green, lush and of high nutritional value, and during the dry season (April to September–October) the deciduous woody plants (trees, bushes and shrubs) lose their leaves while herbaceous plants (herbs and grasses) mature, become senescent and die off, losing their nutritional forage value. During the dry season in particular, grazing generally becomes short in supply especially in the high grazing density areas near homesteads and water points.

During drought, grazing is short in all areas but more so in the traditional livestock grazing areas. The smallholder areas have always claimed and viewed wildlife areas as their fallback reserve grazing. This annual seasonal change trend and frequent drought occurrences have implications in the way communities manage their livestock. Livestock, especially cattle, seasonally "migrate" or are driven away from intensely and overgrazed nearby areas into wildlife and forest areas. This movement compromises the security and health of livestock as they become easy prey to the predatory wildlife. The risk of disease spread from the carrier wildlife increases, but also from livestock to wildlife.

There are also spatial differences in the distribution of vegetation. Generally, during the rainy season, cattle are herded communally away from homesteads and croplands, and kraaled/penned near homesteads at night. Since small ruminants cannot walk long distances, they are left to graze and browse near the settlements. This management system exerts heavy grazing pressure around settlements, leading to linear or circular patterns of localized overgrazing. Naturally, riverine areas, kopjes, water points, areas of different soil types (e.g. sodic, sand or clay) support different types of vegetation. Wildlife and livestock prefer and spend different times in these areas according to their preferred habitats and availability of grazing. An example is riparian areas which may support green grass species during the dry season. Both wildlife and domesticated herbivores congregate in these areas during the dry season, creating an obvious point of conflict. It is the SWM Programme's objective within the theory of change philosophy to support sustainable management of these spatially and temporally different vegetation types through scientifically tested and acceptable land use systems.

B.1.3. New settlements, human and livestock populations

In Mucheni CC, the Rural District Council (RDC) has reported an increase in illegal and unplanned settlements, which is also true for Inyasemu and Simalaha CCs. These illegal and unplanned settlements are occurring mainly in the grazing areas, depriving the domesticated herbivores of grazing areas. Livestock numbers are also reported to be on the increase. The high population growth of both humans and livestock, particularly over the last two decades, has led to more intensive cultivation on lands better suited for grazing. The combined effect

of this is a reduction in the size of the area available for grazing and subsequent decrease in plant species diversity due to increased grazing and browsing pressure on the overstretched finite grazing resources in direct competition with wildlife. Of major concern are the observed and likely accumulated continuing deleterious effects of overstocking and overgrazing, which are causing severe and potentially irreversible ecological degradation, especially in highly erodible sodic soil areas. Proper land-use planning, which the SWM Programme in KaZa is promoting in the CCs, would go a long way in addressing some of the challenges associated with the current land use systems.

The livestock study by the SWM Programme in KaZa observed that there were poorly understood dynamics of common pool resources utilization and management. This calls for a community and demand driven, adaptive land-use planning with full community participation and high probability of adoption and implementation taking full consideration of the scientific facts like animal disease spread, carrying capacity of the rangelands and stocking rates. In essence and within the ToC philosophy, both land-use planners and communities need to change and find common ground for adoption of sound and realistic principles. A number of integrated wildlife livestock management models could be used as guides in the planning process. These models include mixed ranches, buffer zones, wildlife corridors or concessionary and managed livestock grazing in wildlife areas during severe grazing shortages in the traditional "reserve" grazing areas or agistment arrangements. In addition, fodder banks and fodder reserves concepts need to be explored further.

B.1.4. Natural resource management committees

Grazing is mostly communal, unorganized and with no fencing. Management of such common pool natural resources like grazing requires grass roots involvement and control through local committees. Such committees together with village heads are in place but generally inactive. These committees require revival and institutional reform, and new, wider and constitutionality legal mandates, to handle sustainable management of the resources. The local community-based grazing association specifically to manage the forests and grazing areas, centred on the socially, economically and traditionally highly priced livestock, should form the foundation of the resource management system. In Mucheni CC, it was noted that the active arm of the community was the resource monitors, who work very closely with ward and village environmental management committees. The resource monitors were put in place under the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) and have continued to operate even up to now. Unfortunately, these resource monitors lack accountability as their reporting structure is not clear. The communities need a "self and locally" well-funded and understood natural resource management master plan where all resource users participate in its management. It was observed that wildfires and illegal or unsanctioned timber harvesting and opening up of new cropping lands were by and large uncontrolled and rampant while gully reclamation was non-existent. To this end, a participatory and adaptive land-use planning understood and owned by the community is a prerequisite.

B.2. Way forward

Herbivore production is benched on natural vegetation. This resource is under threat in terms of encroachment by unplanned new settlements, human and livestock population increases, absence

of a grazing management system and climate change. As a way forward there is need for:

- participatory land-use planning;
- formation of dedicated livestock production and marketing associations;
- assessment of the carrying capacity of the available grazing resource as a management tool; and
- implementation of a common pool resource management system consistent with climate change, sustainable use of wildlife and sound human–wildlife conflict management.

C. Water supplies and livestock support infrastructure

C.1. Key results

C.1.1. Water supplies

Hydrological assessment studies conducted in the conservancies highlighted water as a major constraint to agricultural and livestock production in Binga (Dzvairo, 2019), Kazungula and Mwandi Zambezi Rivers both in terms of quality and quantity. Humans and livestock walk long distances, up to 7 km, to water points during the dry seasons. Most human–wildlife and livestock conflicts occur at these water points. The main sources of water in the three conservancies are:

- streams and rivers – Most are seasonal and not reliable as sources of water.
- "High" yielding and perennial springs – Springs are limited in number and poorly distributed and not fully harnessed for the benefit of humans, livestock and wildlife.
- boreholes – There are a number of boreholes across the conservancies acting as main sources of water. Besides being insufficient and some of them yielding salty water (brackish water), there are always breakdowns which take a long time to be attended to either due to non-availability of spares or lack of local capacity to attend to the breakdowns or drying up. For instance, at the time of the SWM Programme water assessment and livestock study in 2019 in Mucheni CC, 48 percent of the boreholes were not functional. Community capacity-building through activation or formation of water point management committees, training of locally based pump minders and levying of the resource users are advocated.
- dams – There are numerous small to medium-sized dams in the three target conservancies. Some dams have been breached and are awaiting repairs. These are normally not perennial and dry up by August or September, except for a few.

C.1.2. Dip tanks

According to the DLVS, tick-borne diseases are the major cause of cattle and goat mortality in the SWM Programme's target areas, contributing up to 60 percent of reported deaths. Tick and tick-borne disease control is therefore paramount to any successful cattle and small ruminant production system. This is usually done through plunge dipping. However, the number of dip tanks for efficient disease control in the three CCs is insufficient. For example, there are five dip tanks in the Mucheni CC and none in either Inyasemu or Simalaha CCs. Unfortunately, three of these dip tanks in Mucheni are not operational during the dry season due to shortage of water. These dip tanks are overstretched with some of them handling more than 2 000 head of cattle against a desirable census and design capacity of under 1 000 head. Most cattle keepers walk

km to dip tanks – too long a distance for a system which recommends a maximum distance of 3–4 km. The livestock study in Mucheni also observed that there were no optimally functional handling facilities at four of the five dip tanks so the animal health assistants were limited in their ability to handle livestock brought to them for examination or treatment (Figure VII.2). The general absence of appropriate livestock handling facilities is a significant constraint especially as regards handling of large animals like cattle.

Figure VII.2: Spray race in disrepair (©F. Chinembiri)

C.1.3. Feedlots and sale pens

Existence or construction of functional feedlots and pens is an indicator of livestock development in an area. There are no established and functionally active feedlots and sale pens in the SWM Programme areas of action. This is a reflection of the poor development of the livestock marketing system. However, there are partly active and disused sale pens at distant points like Manjolo, Mlibizi, Lubimbi, Kariangwe and Mswazi (Lusulu) in Binga. These sale pens are in different states of disrepair due to neglect and lack of funding. Experiences from elsewhere are that sale pens are capable of generating enough funds through market levies to sustain their management, maintenance and repairs. Observations were that there were no dedicated community-based committees to oversee the operations of the sale pens. However, dip tanks in some cases formed centres from which private buyers bought cattle. The SWM Programme in KaZa envisages supporting the rehabilitation and/or construction of some of the livestock infrastructure such as dip tanks and sale pens.

C.1.4. Abattoirs

There are three abattoirs accessible to farmers and within the districts of Binga and Hwange. These are Manjolo (25 km from Binga Centre), Matetsi and Madumabisa (both near Hwange Colliery Mine) abattoirs. Manjolo abattoir is community owned and slaughters only cattle, but also has capacity to process small stock. There are no abattoirs in Inyasemu CC. The nearest abattoir to the community in Inyasemu is 70 km away on the eastern side of the conservancy, far from Kazungula District and the conservancy alike. There is only one functional abattoir in Simalaha CC.

C.2. Way forward

The state of water supplies and livestock support infrastructure is poor and, in some cases, exhibits neglect and disrepair. As a way forward it is recommended that:

- more water points be rehabilitated or provided that could, in addition, reduce human–wildlife conflict;
- water demand management committees for each water point be put in place and a user-pays operational system be instituted;
- borehole minders be trained and equipped to carry out repairs and maintenance; and
- sale pens and dip tank handling facilities be repaired and/or constructed to support disease control and improved livestock management and marketing.

D. Livestock and livestock products marketing

D.1. Key results

D.1.1. Marketing systems

The marketing systems of livestock in the three CCs of the SWM Programme in KaZa are neither developed nor organized. Private sector livestock support industry, like auctioneers, stock feed manufacturers and suppliers, veterinary pharmaceutical suppliers, and livestock transporters, is

still in its infancy or non-existent in all three CCs of Mucheni, Inyasemu and Simalaha. Markets are mostly informal, characterized by and dominated by middlemen, farmer-to-farmer sales and fragmentally organized sales to high demand areas of Bulawayo and Harare. Potential livestock market pathways and models include organized and scheduled private sector auctions, group mobilization and sales to contract buyers, bulking and selling and fattening schemes. It is anticipated that a well-organized marketing system will see an increasing demand for livestock and livestock products in and around the conservancies and offer farmers opportunities for market participation, thus overcoming some of the existing market challenges.

D.1.2. Cattle and beef marketing

The local markets in the three CCs are low and monetary transactions are not as common, thus purchases and sales translate to barter exchange for cereals. However, there are income earners like civil servants and middlemen based in the conservancies who are active players in the cash transacting system of livestock. Traders including some civil servants also bring in grain from outside the conservancies or even outside Binga District, for example, to exchange for livestock. There are no registered and functional butcheries in the three conservancies. This is partly attributed to non-availability of electric power to assist with cold chain management in the processing and marketing of meat and meat products. Meat can also be bought from informal sellers found especially in business centres. These sales are not time-related but happen when individuals decide to slaughter and sell to meet emergencies like educational needs or health bills. However, beef is sold in butcheries, fresh and/or frozen, found in the business centres, especially in Kaani Ward where there is access to refrigeration facilities. Families from the wards who go to Binga Centre for different activities also buy ready-cooked meat from restaurants, at the central market (Renkin), or at other shops and small supermarkets.

D.1.3. Small ruminants marketing

As with the beef market, the goat markets are underdeveloped with low inputs and know-how in the whole district of Binga. There are local informal markets where goats are bought/sold. In the wards, farmers sell for instance to teachers in the local schools or barter exchange their goats for other household needs. Local sales are not as high compared to sales done outside the ward. A medium-sized goat can be sold at USD 15–20 in the rural wards and at USD 30 in Binga town or outside the district. In urban Binga, goat meat prices are often comparable to those of beef and many retailers indicate frequent shortages in local markets. The price of beef is pegged at USD 2 per kilogram, thus twice the price of goat meat considering that a 50-kg goat is sold at USD 50.

D.1.4. Poultry marketing

Poultry is the number one livestock that is dominating the local and external market. These include chicken and guinea fowl. In the locality, households with a larger poultry holding sell by barter exchanging with those without. They get cereals especially, 20 kg of grain for one chicken. However, such transactions are seasonal, happening only at harvest time and only if it has been a season of plenty. The local market expands when people who come into the wards purchase poultry for relish or for resale. The buyers come in with food items or kitchen utensils which they give in exchange for the birds, for example, a 2-litre water jug exchanged for one chicken. In cases where money is involved, one chicken would be purchased at USD 2–3 and guinea fowl for USD 5–6. These transactions are most common during workshops and church gatherings. The external market is dominated especially by women.

In Zimbabwe, the birds are secured in the wards and carried out into Binga town where some are sold and some transported to Hwange, Victoria Falls and Bulawayo. Chicken is the most exported outside the district (Figure VII.3). They sell faster since they are affordable compared to guinea fowl. This business has since expanded in the study areas so much that Internal Savings and Lending Schemes (ISALs) groups were formed, which have undertaken poultry keeping and marketing.

D.2. Way forward

The way forward here is based on the hypothesis that a well-organized and developed marketing system drives livestock production. To this end, the following are recommended:

- improved market access to provide farmers with the incentive to invest in management technologies to increase their livestock quality;
- innovation platforms, forums that facilitate communication among farmers, government extension officers, market players, and input and service suppliers around local production;
- formation of a locally based livestock development association to oversee livestock development issues and in particular develop a vibrant unified livestock marketing system;
- development of sale pens and support for a central marketing hub;
- training and capacity building of farmers to help them understand and handle modern-day marketing and contracting issues of livestock, meat and livestock by products; and
- promotion of private sector participation in livestock development and marketing.

E. Lessons learned and recommendations

A number of lessons have been learned in the area of the SWM Programme in KaZa regarding livestock to date. The major lessons include:

- The area has potential for improved livestock production with potential to increase contribution to meat and meat products supply chains especially through promotion of small stock production.
- The current production level is low and constrained by a number of factors including inadequate water supplies and frequent disease outbreaks.
- The environment is suitable for both livestock production and wildlife.
- The grazing is disorganized and under threat from illegal settlers.
- Livestock marketing is not developed and the private sector is also not active in the area.
- Livestock support infrastructure is inadequate and in a state of disrepair.

From these lessons four major recommendations are made which are commensurate with the ToC whose logic hinges on the following: alternative proteins (support to alternative sources of protein) and sustainable consumption (awareness campaigns on alternative sources and support to alternative sources of protein).

- A local community-based livestock development association should be formed to spearhead livestock development activities. This association would act as an entry point to all livestock development matters.

- Goat and poultry production interventions should be actively promoted as alternative protein sources.
- A participatory land-use plan incorporating grazing management should be undertaken.

Disease control infrastructures should be established and, where they exist, be revamped to reduce occurrences of livestock diseases.

Figure VII.3: Chicken to market (©F. Chinembiri)

Summary

This chapter documents the food consumption patterns of the Tonga people living adjacent to conservancy areas in the site of the SWM Programme in KaZa (Mucheni and Inyasemu). It relies mainly on a socioanthropological approach and on preliminary quantitative data. It shows that wild meat consumption is low but plays a key role (with wild fruits and vegetables, and fish) in supporting coping strategies of the highly food-insecure population. It recommends taking into account the diversity of species consumed (mainly birds and rodents, but also insects, which are not treated in this report) so as to reduce wild meat consumption. Improving meat or fish availability will not be enough to increase local food consumption since the purchasing power is low and the local market structures are weak. The development of alternative sources of meat needs to contribute to the fragile local economy by integrating the most vulnerable economic stakeholders.

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VIII. THE FOOD SYSTEM

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Introduction

Results presented here are backed by the activities conducted under activity R4.1.A2 "Qualitative survey on household consumption in rural and urban areas and on outside home consumption" of the SWM Programme in KaZa. They contribute to a better understanding of the levers of change (identified in the theory of change, see Chapter II) for improving local food security and reducing the consumption of wild meat. This chapter describes the food consumption patterns of the Tonga people living near conservancy areas: Wards 3, 4 and 5 in Binga District (Mucheni Community Conservancy [MCC], Zimbabwe), and Nyawa Chiefdom found in Kazungula District (Inyasemu Community Conservancy [ICC], Zambia). Food consumption patterns include practices for purchasing, preparing and sharing food, and the social and cultural values that contribute to frame these patterns. Special focus was given to wild meat and other wild products.

Materials and methods

A socioanthropological approach to food consumption was adopted (based on the methodological guide by Figuié and Lepiller, [in prep.]). Data were collected using an ethnographic perspective, and employing a mix of qualitative methods to gather information from a wide range of perspectives, including observing and interacting with the stakeholders of the local food system. This methodology was intended to overcome, as far as possible, the difficulty in studying activities that are largely illegal, i.e. wild meat consumption.

From April 2019 to September 2020, the SWM Programme in KaZa implemented the following activities:

- a desktop review of secondary data available on wild meat consumption in Zambia and Zimbabwe (and reported in Lepiller and Dutilly [in prep.]);
- in-depth face-to-face interviews with: a) experts on the Tonga people in Binga, Harare and Bulawayo, and with local authorities in Binga and Nyawa (38 interviews); and b) with members of rural households, mainly women in charge of preparing food (30 in Mucheni CC and 6 in Inyasemu CC);
- Focus group discussions (FGDs) with youths, hunters, women in charge of preparing food, the elderly, and heads of households (eight focus groups in Mucheni CC and four in Inyasemu CC); and
- participatory observations were strategically made in households (kitchen and garden) and market areas.

During these FGDs, interviews and participatory observations, there were several themes: agricultural and economic activities, hunting activities, food, cooking and eating activities (including a quick 24-hr recall survey in Inyasemu CC) (reported in Chileshe and Lepiller [in prep.] and Figuié *et al.* [in prep.]). In Mucheni CC, food diaries are currently being collected from among a set of 30 households, for further quantitative analysis; these are only mentioned here in some preliminary results of this study. Additionally, a quick survey was conducted in September 2020 for a rapid assessment of the COVID-19 impact (20 interviews in Mucheni CC). Participatory observations and in-depth interviews involving one member of the team belonging to the community (Luzibo Munsaka, a Tonga researcher from Binga) had the advantage of breaking down the barrier between interviewers and interviewees and increasing the reliability of the collected data. Data have been collected with the agreement of the communities. Women have been over-represented in the sampling since they are key informants when it comes to studying households consumption.

A. The foodscape

Before addressing the food patterns at household level, it is necessary to highlight the main characteristics of the local foodscape. A foodscape is defined by the local food production areas, the food distribution infrastructures and the local food policies and communication/advertising strategies (Foodscapes, 2020). The key results presented here are based on information collected mainly in MCC but many features are common with ICC. What are the features of the local food space that influence the household food consumption in the KaZa site?

A.1. Key results

A.1.1. An important deficit in the local production of staple food

In the SWM Programme site in KaZa, local food production is limited. Poor soils and relatively low and erratic rainfall (below 450 mm in MCC, 600–700 mm in ICC) make crop production risky and difficult. Yields are low (less than 200 kg/ha for maize in Ward 3 of Binga) and irregular. Most areas have high deficit in staple food production (except Lusulu in Binga RDC, which is said to be the breadbasket of the district, but most grain production is sent to Binga town and Bulawayo). In 2015, the production of cereals in Wards 3, 4 and 5 of MCC covered respectively three, four and seven months of the population's consumption (WFP, 2016). Data obtained by the SWM Programme team in KaZa showed that the situation has since worsened: the reserve of cereals produced at home covers the households' consumption from two or three months in the poorest households to five months in the wealthiest ones. Local purchasing power is low (the poverty rate in the three wards of MCC is around 87 percent (WFP, 2016) and 57 percent in the Southern Province of Zambia where ICC is located [Central Statistical Office, 2016]). Food aid programs, from the government and NGOs, are essential to cover the local deficits in cereals.

Home gardening (in particular sweet potatoes, okra, black-jack (*Bidens pilosa*), rape, cowpea, pumpkin, eggplants, papaya, banana) is a woman-led activity accessible for households living alongside lowlands and riverbanks. It is an important way to complement and diversify diet (mainly from May to July), and to provide income through local and short-distance trade.

A.1.2. Low meat production, less attractive and "export-oriented" market

Farm animal ownership is widely practised but the production of cattle-based food is very low in the KaZa site and contributes little to local consumption: in Binga Rural District, cattle supply a local farm-to-farm market of living animals mainly used for savings or as draught power. Cows are sold when cash is needed, to foreign collectors supplying the meat market of Bulawayo and Victoria Falls, and to a lesser extent the consumers in Binga town (there is a slaughterhouse in Manjolo, see Chapter VII). Beef is locally consumed only for social events (see below), as goats and chickens are the main sources of local meat consumption, except for poor households, where these animals play the role of savings and are exchanged for cereals during the lean season or are sold to collectors.

Fish production is important in Lake Kariba, which supplies 90 percent of the Zimbabwean national market, mostly with kapenta fish (*Limnothrissa miodon*), often too expensive for local consumers in Binga Rural District. Local fish consumption mainly relies on artisanal home fishing and on trade by communities living close to the lake (e.g. Mujele Fishing Camp).

Figure VIII.1: Main food flows in Binga Rural District, Zimbabwe (*Source:* Authors)

Wild meat is hunted and consumed locally (see Chapter V). It comes from safari areas (some hunters only look for the trophy and the meat of the game is distributed to the personnel of the safari or to the heads of the neighbouring communities), crop culling (organized by the authorities in retaliation for crop destruction or injury to people) and poaching. Wild meat from poaching is consumed by the family hunters. It can also be sold or bartered but this is risky and not so lucrative (poachers asking for too high a price can be reported by potential buyers). Small animals like rodents, insects or worms are also collected for food by various family members (children, women). There is also a crocodile farm in Binga town whose production is exported to South Africa and Europe.

To sum up, and as shown in Figure VIII.1, availability of animal-based food (meat and fish) is limited in Binga Rural District. A significant share of the production is traded on more attractive markets with better-off consumers (Bulawayo, Victoria Falls for cattle, the whole country for kapenta fish and even Europe for crocodile meat). In Nyawa, Zambia, the availability of wild meat seems to be greater, through illegal hunting, in less dense areas and those next to the game management area (GMA). Commercial trade can also occasionally occur on the main roads.

A.1.3. Self-subsistence as the main objective of most households and food aid as a necessity to overcome the deficit in the local production

As mentioned above, the local food market is weak and food commercialization infrastructures

are limited to Binga (one to two hours' drive from Wards 3, 4 and 5) and Nyawa Centres. The network of dirt roads is not all-weather and the prices of transportation are dissuasive. However, some rural families, among the wealthiest, go once a month to Binga town for different reasons and take this opportunity to buy food, including fish and meat. Some rural business centres, which are poorly stocked, are convening points for some shops and occasional street vendors offering manufactured food at relatively high prices (compared to prices practised in Binga town for example) such as sugar, cooking oil, drinks, vegetables and fish. Young people may occasionally be found there, offering to catch wild animals on demand, in order to buy internet credit cards or other goods.

Households are poorly integrated into the market economy. For the majority of households in KaZa, food self-sufficiency is the main objective, since employment and income opportunities are rare (limited, for instance, to employment in safari areas, production of clay tiles, carpet making). Home consumption mainly relies on home production (with very low yield), bartered food and food assistance (Table VIII.1). No differences were found between the two sites at this stage of the study, which a planned quantitative survey based on food diaries may confirm or deny. Households with draught animal power can cultivate maize and cotton as cash crops (confirming that cattle ownership is not only a form of savings, but is also a productive asset, and an indicator of wealth, much more than a source of proteins). Remittances (from men working away from home in gold mines) are another source of cash used to buy food, but with the consequences that many households are headed by women and have limited labour force. Food gifts are common among households to support the most vulnerable (with maize or beans) or to honour those with specific status, e.g. traditional chiefs.

Table VIII.1: Main sources of food for households in MCC and ICC (*Source:* Authors)

Food items	Food sources				
	Home production	Bought or bartered	Food assistance	Gift	Distribution from safari, cropping, etc.
Maize grains	x	x	x	x	
Sorghum	x	x		x	
Maize meal		x	x	x	
Beans and lentils			x	x	
Cowpeas	x	x		x	
Domestic Vegetables	x	x		x	
Cooking oil		x	x	x	
Meat and fish	x	x		x	
Wild meat and fish	x	x		x	x
Wild fruits	x	x			
Wild vegetables	x				

A.2. Way forward

Despite the importance of livestock in the KaZa area (see Chapter VII), meat production is low, and is mostly traded on more attractive markets. An increase in the local livestock will not necessarily increase the production of meat (due to the numerous other functions of livestock), and will not necessarily affect local consumption of meat, due to the limited purchasing power of most households. These findings suggest that:

- Farmers lack investment capacity to invest in agriculture and livestock. In addition, any investment is very risky due to drought, flood, diseases and wildlife attack, as well as market instability. Any attempt to increase local production of sources of meat, fish or other sources of protein needs to target risk reduction (e.g. malnutrition). A first step could be to support free vaccination of livestock to reduce the high burden of infectious animal diseases.
- Supporting cattle ownership will benefit the production and productivity of cereals (through draught power), and the local income of the better-off households (and to the male income). Supporting goat production will benefit local savings and food consumption. Supporting chicken production will directly benefit the consumption of the poorest households (by home meat consumption, or by increasing their capacity to barter or sell chicken for cereals).
- The development of an "alternative supply chain of protein" should not compete with existing ones, but should target support of the vulnerable stakeholders among existing ones. As an example, the sale of dry fish brings a complementary income for poor households. Supporting fish production and trade should not exclude these stakeholders to the benefit of wealthier ones with stronger capacity (economic, technical and social) to invest in new economic activities.

B. Household food patterns

As presented above, local food production is low, food markets are incipient, and local consumers have low purchasing power. What is the consequence for the local food diet? How do households manage to obtain food adapted to their needs and to their tastes?

B.1. Key results

B.1.1. Scarcity of food

The SWM Programme site in KaZa is mainly populated by Tonga people. Food consumption among the Tonga people has changed significantly since their displacement from the Zambezi River in the late 1950s for the construction of the Kariba Dam on the Zambezi River (Tremmel, 1994). Though this past period was hard with a high burden of infectious diseases and child mortality, the Tonga people remember their living on the riverbank of the Zambezi as a period of great affluence, in particular due to their easy access to fish, wild meat and wetlands. Nowadays, food consumption is characterized by scarcity for most households. Food insecurity affects up to 88 percent of the households (ZimStat, 2012; Central Statistical Office, 2016) and the area has been highly dependent on regular food aid for many years. Most households can only afford two meals or even one meal a day during the long lean season (from October to March). Only 20 percent have three meals a day all year long, and 32 percent never do (Table VIII.2).

The type of products consumed also varies with households' wealth: the poorest households consume cereal husk, wild vegetables and insects, while the wealthiest have cereals (maize and rice) and regular consumption of meat or fish, tomatoes, onions and cooking oil, and drink tea and sorghum beer. Food aid (maize, beans and lentils, cooking oil) is distributed in most households with elders, or during the lean season, and during special disastrous events (droughts, flood, etc.). At Christmas, households seek to improve their meals by adding, as far as possible, meat, bread and larger quantities of cooked beans.

Table VIII.2: Number of month(s) in the year with at least three meals a day in MCC (n = 60 respondents) (*Source:* Authors)

	Number of month(s) in the year				
	0	1 to 3	4 to 6	7 to 9	10 to 12
Number of households	19	3	8	7	23 (including 20 with 12 months)
% of households	32	5	13	12	38 (including 33 with 12 months)

B.1.2. Low diversity of the diet

Diets of most households are predominantly based on cereals, especially maize (*nshima* or *sadza*) and vegetables, and rarely include animal products (Table VIII.3). Although households own domestic animals, many households keep them for ceremonial or other special occasions rather than for food. Households seem to rarely eat animal by-products because milk is mainly reserved for feeding young animals and eggs for hatching. In other words, diets are poorly diversified.

In ICC, when asked questions such as "In your view what is a good meal?", "In your view what does a good meal consist of?", and "How often do you have such a meal?", all participants explained that a good meal is comprised of *nshima,* meat – goat, fish, beef, chicken, guinea fowl, pork – and a vegetable. Nearly everyone said they rarely have such meals or only on special occasions such as Christmas or social events.

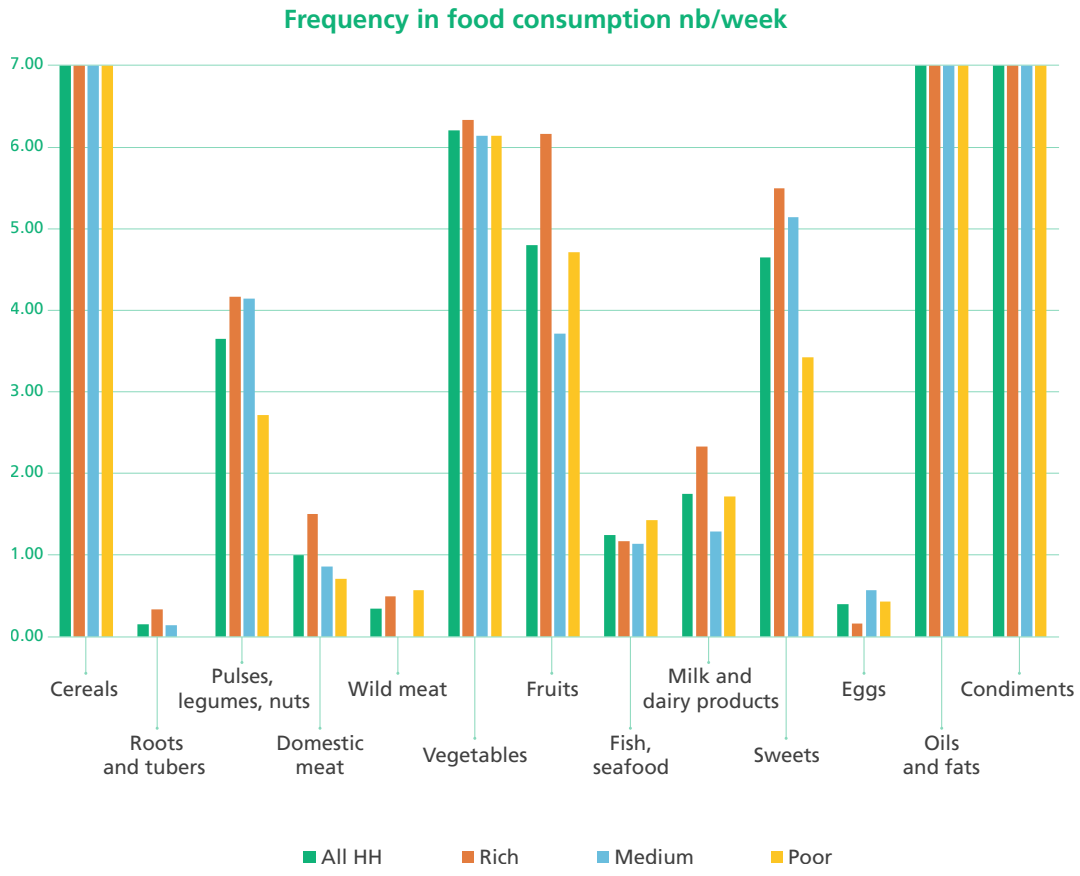
Table VIII.3: Description of a food day in MCC (very similar in ICC) (*Source:* Authors)

Meal	Local name	Place	Composition
Breakfast (morning food)	*Mbusyabulo*	Home	porridge with pumpkin or tamarind
Lunch	*Chisusulo*	Home/Field/ School	*sadza*, vegetables, pulses, *mahewu* (fermented drink)
Dinner	*Chilalilo*	Home	*sadza*, (meat), vegetables

B.1.3. Frequency in food consumption

By participating in the life of a small sample of households, the project team was able to record the frequency of consumption of the main food groups in MCC (Figure VIII.2). These

Figure VIII.2: Food consumption frequency among wealth groups in Binga District, wards 3 and 4 (n = 20 households (HH), February–March 2020) (*Source:* Authors)



observations confirmed the importance of cereals and vegetables as the basis of the daily diet. Meat consumption was limited and varied according to households. The average, once a week, hides disparities: only eight out of the 20 households had consumed meat during the week of the survey (from one to four times a week). Classification of the households according to their wealth status indicates that meat consumption was higher in wealthy households.

Consumption of wild meat was limited (0.35 day in a week on average, that is, approximately once in 3 weeks) and hides disparities: three out of the 20 households had consumed wild meat during that week (from two to three times a week). It includes insects (9 records), toads (4 records), squirrels (1 record) and tortoises [*Testudinidae*] (1 record). To be noted that a food item can be recorded many times in the same day. This consumption has to be interpreted in the seasonal context: the observations were conducted in February/March, during the rainy season, when insects are more abundant. This confirms the interest in studying the seasonality of food consumption.

This set of data covers the composition of 420 meals, including breakfast, lunch and dinner. It was recorded during seven sequential days in 20 households in MCC, in February and the beginning of March 2020. Households are classified using the criteria for wealth group profile (WFP, 2016).

Figure VIII.3: Meal preparation in KaZa (KaZa, Zimbabwe) (©Brent Stirton/ Getty Images for FAO, CIFOR, CIRAD, WCS)

B.2. Way forward

Food security is an issue for the majority of the households in the SWM KaZa site. The problem is quantitative (reduced number of meals during the lean season) and qualitative (low diversity of food). These findings suggest that:

- Protein deficit is not the only problem to address in terms of food security. Protein-energy malnutrition (PEM) is probably widespread.
- Food production is limited in the area. In addition, as most households have low purchasing power, food accessibility is another main issue. The attempt to increase local food production must target the local population as consumers but also as producers, with the aim of increasing the income, and then the food purchasing power, of the poor households.
- The production of alternative sources for home consumption needs to target the lean season (September to March). Food conservation, through drying, is the only accessible technology at household level.
- Potential for increasing home production in the most insecure households is limited by their lack of assets (e.g. draught power), labour force (e.g. female-headed households) and sensitivity to risk. Propositions aiming at increasing home production of food could first target the securitization of the current activities.

C. The role and place of wild products in food habits and culture

Food is multifunctional: eating brings nutrients but also pleasure; sharing meals is a social activity; food habits and taboos are part of the cultural identity. Women are in charge of preparing food (Figure VIII.3) and are thus key stakeholders in the decision-making process. They have to manage the trade-off between the different functions of food. In such a context, what are the different functions of wild meat and fish?

C.1. Key results

C.1.1. Wild meat and fish as key elements of the local culture

Meat is highly valued in Tonga culture. Its consumption symbolizes wealth, as serving meat is a way to honour a guest. Among the different types of meats, wild meat from large mammals is highly valued, at least among elders, nostalgic for old times. Wild meat is seen as more natural than the meat from medicated and vaccinated farmed animals. Meat from large game is supposed to bring strength for whoever consumes it, reflecting the magic thinking according to which "you are what you eat". In addition, despite some cases of anthrax due to the consumption of sick hippo meat, people do not seem to fear zoonotic diseases from wild meat. Nowadays, for elders, meat preference goes in the following decreasing order: wild meat> cattle> goat> fish> chicken. Youth preferences seem less homogenous.

Fishing is also very important for the Tonga people, not only as a source of food but as part of their cultural history, when Tonga people, before being displaced for the construction of the Kariba Dam, were "the People of the Great River". The elephant also has high cultural value; it symbolizes the memory of the Tonga people, and the important role of the female in the elephant herd is supposed to reflect the organization of the matrilinear Tonga society.

The comprehensive inventory of the local food items (Table VIII.4) and of the local recipes compiled in the project study (Figuié *et al*., in prep.) shows that wild meat (including rodents, birds, reptiles, amphibians or insects) and wild fish contribute significantly to the local food culture. There are numerous taboos (e.g. taboos on fish associated with the River God, the Nyami Nyami, or on the mother's animal totem) and magic thinking (e.g. women eating crocodile meat would be protected from attacks while fishing) related to the consumption of wild animals. This indicates that the cultural role related to the consumption of wild meat and wild fish transcends the sphere of food culture and is part of the whole culture.

Nearly all parts of the animals are consumed (except for the skin, intestines and blood of some animals) and only few species are considered disgusting (such as donkeys and dogs). Meat is never consumed raw. It is boiled before being fried. The ideal rarely achieved, from the point of view of the population, would be to kill a goat per month, a chicken per week and to have fish the other days. The meat of a goat can feed the family for several days and is then sun-dried for conservation.

Table VIII.4: Food groups and main food items consumed in MCC (*Source:* Authors)

Food groups	Main food items of this group
cereals	maize, sorghum, millet, sesame seed
vegetables	okra, black-jack, chourmolia, rape, "giant vegetable", pumpkin, butternut, onion, tomato, leafy vegetables (*nyevhe*, cowpea leaves, pumpkin leaves)
meat, poultry and offal	chicken, goat, guinea fowl, beef
fish	bream, jackson's corner, tigerfish, catfish (*mubondo*), tilapia (*tuchele*), mackerel
pulses, legumes and nuts	cowpea grain, groundnuts, bambara nuts
root and tubers	sweet potatoes
fruits	banana, pawpaw, mango, citrus, watermelon, guava
milk and dairy products	cow milk
eggs	chicken eggs
oils and fats	industrial oil, local animal fat and vegetable oil
sugar	industrial sugar, honey, sugar cane*
condiments and drinks	traditional (maize and sorghum) and industrial beers, tamarind, tea
wild meat	impalas, wild pigs, porcupines, insects (locusts, caterpillars), rodents (mice, rats), birds (quails, quelea), worms (*vungu*), bullfrogs, squirrels, rabbits, cap hares, tortoises/ mountain tortoise
wild fruits**	*nkula*, baobab fruits, tamarind, *mndoza, shuma, tsubvu, nsthovwa, inji*
wild vegetables**	wild okra, amaranth, *Corchorus*, spp., Bidens *pilosa, zakalanda, syuungwa, syalundu, bbonko, tende, kandongondo,* moringa, baobab leaves, *chisyu, namunywa, munsale, matanga, telele/mudele*
wild mushrooms**	*tsuketsvuke, firifit, nzeve, ndyu, boowa*
wild tubers**	*makuli, gompe/gombe, mwanja,sozwe, kabombe*

*From a sugar plantation in Ward 4.

**The vernacular names of the wild food reported here are the names reported by the respondents. The identification of the respective specie(s) with their scientific name has been initiated but is still in progress.

C.1.2. Decrease in wild meat contribution to the daily local diet

In the past, meat of small wild mammals was consumed daily, farmed animals were killed and shared at social events (wedding, funerals), and large game was reserved for special ceremonies (such as hunters' ceremonies). Nowadays, wild meat is consumed more rarely. Its cultural importance contrasts with the current daily practices. A first approximation indicates that wild meat represents around 26 percent of the meat consumption (Table VIII.5). Moreover, the consumption of wild meat is restricted to small animals such as insects and toads. The frequency of consumption is limited, around once in three weeks, but with high diversity among households (up to three times a week).

Table VIII.5: Share of wild food in food consumption in MCC (n = 60, self-reporting) (*Source:* Authors)

Share (%, annual average) of wild food	Wild meat	Wild vegetables	Wild fruits
wild/total (wild and domestic)	26	54	69
minimum	10	30	50
maximum	50	90	90

Diversity is also found within households. There is a gender issue in accessing the product of hunting: when small animals are killed or when prey is scarce, the hunters tend to cook, share and eat them outside the household, meaning that the rest of the occupants of the household, especially women and young children, do not benefit from this nutritional intake. Women and children are more likely to have access to the small prey that they have collected themselves, like rodents, small birds, toads and insects.

Fish consumption (wild fish) remains relatively more accessible and fish is consumed more than once a week. Fish is also a currency for exchange: in Binga, 1 kg of bream or tilapia can be exchanged for 5 kg of grains (maize) or for 1 kg of beans, 1 cupful (300 ml) of mackerel or catfish for 2 cups of any other food item, especially mealie-meal (a kind of liquid porridge).

C.2. Way forward

Like any food, wild meat and fish fulfil various functions (nutritional but also cultural) and these vary according to the species consumed. Moreover, the consumption of wild meat and fish has evolved over time. Regarding large game, whose consumption could be more problematic from a conservation perspective:

- The drivers of its consumption are numerous: in particular, pleasure (taste), sociability, cultural identity, health (nutrition and safety) and economic (cost). Wild meat is unanimously valued among the people because of its good flavour, because it is free of chemicals and medicines and because it is considered "free meat" (meaning that it does not represent a loss of capital, in contrast with domestic meat). Substitutes for wild meat need to fulfil these different functions.
- The consumption of wild meat has evolved locally over the past decades: wild meat consumption has decreased (with the reduction of hunting activities) and local consumers have already developed alternatives through livestock.

In order to support alternatives to wild meat consumption, the SWM Programme in KaZa needs to draw on existing "functional equivalents" of wild meat in the local culture:

- Beef is highly valued and can replace the social function of wild meat.
- Goats and chicken (and beans from food aid) replace the nutritional function of wild meat, and its role in a barter economy.
- Globally, animal-based foods can be substituted for each other as ingredients of the sauce that accompanies the core food, mostly *nshima*, but (dried) fish is particularly useful in enhancing the flavour of a sauce.
- "Neglected" wild meat, like rodents, birds and insects, is used as a substitute for common game species for access to low-cost food (its consumption also has a function of crop protection).

What seems to have no substitute is the cultural function of wildlife associated with hunting activities and wild meat sharing. The SWM Programme in KaZa must support the cultural life locally, which could be done by associating occasional hunting in the conservancy areas with cultural activities or events, valuing the wildlife knowledge of the elders. The conservation of wildlife needs to embrace the conservation of the related culture.

D. Food and nutritional insecurity: coping strategies

Food insecurity is a main issue for most households of the SWM Programme site in KaZa. In MCC, 79 percent of households are food insecure compared to the national average of 42 percent. Most households rely on food aid during the lean season, but they also develop coping strategies. What are these strategies? What is the role of animals and wild resources in these strategies?

D.1. Key results

D.1.1. Major role of wild fruits and vegetables

The majority of fruits and vegetables consumed locally are wild: wild fruits and vegetables, tubers and mushrooms are an important source of food that greatly improves the diversity of the diet. They represent around 60 percent of the total fruits and vegetables consumed annually and even up to 90 percent in some households (Table VIII. 5). They bring diversity to the cereal-based diet and contribute to nutritional security.

The inventory of the local recipes shows the importance of wild resources. Those are found in more than half of the recorded recipes: wild meat but also, and mainly, vegetables and mushrooms, wild fruits (used for the preparation of many beverages), nuts (including for preparing cooking oil), tubers and honey.

The consumption of wild tubers is limited. Wild tubers, like gompe and mwanja in Binga Rural District, were said to be a last resort since their consumption is risky. Consuming wild tubers requires skills to distinguish the poisonous from the edible ones, and to prepare them in a safe manner. These skills and knowledge are part of the local food culture, and are indicators of a culture of food scarcity. Nowadays, this knowledge is under threat and young people, with fear of failure, prefer to refrain from eating them. Mushrooms are also potentially dangerous foods and only experienced women are counted upon to gather them. Wild fruits are important, for preparing beverages as mentioned, but also for boys and girls who consume them on their way to school; their consumption, though high, is probably underestimated.

D.1.2. The role of wildlife as a safety net confirmed by the COVID-19 crisis

Nationwide measures to limit the spread of the COVID-19 virus have significantly affected food availability and food prices in remote rural areas such as KaZa. The COVID-19 crisis confirms the essential role of wild resources in coping strategies, by supplying households with alternative sources of food and income. As declared by one of the traditional local chiefs in MCC: “We, the Tonga, have a past and this allows us to survive COVID-19. We have our own foods, which we use instead of your modern ones. That is what we are doing now. We have the forests, and the hills and these valleys, and they contain different foods.”

Fishing activities have intensified, partly because school lockdowns have meant children have more free time. Probably for the same reason, catching birds has also become more common. “The birds make a difference and so we are grateful for the birds” declared one respondent. According to local authorities, the hunting of impalas, duikers and bushbucks has increased, in particular at night with dogs, as has the number of hunters. Poaching has increased during the COVID-19 pandemic: the recorded wildlife crime rates are eight times higher than for the same

period in the previous year. Hunting not only supports the food consumption of the hunter's family and community, but also generates income and helps to supply the local market with meat: one can buy a whole carcass of impala for USD 12, or two hind legs for USD 4. More worrying still, hunting has extended to rare species, such as a leopard trapped recently in Binga.

D.1.3. Indirect role of livestock ownership on food security

As stated above, meat availability at the farm level is more dependent on home-raised chickens and goats, and cattle do not contribute directly to household consumption. It however supports farm production, as cattle supply the households with draught power, produce low cost manure for cereals production and thus directly contribute to increasing farm productivity (Scoones *et al*., 2010). Selling ploughing and transport services can also be a substantial source of income. Selling or bartering farmed animals is also an important way to access staple foods.

Livestock also provides a secure form of savings, and probably the most secure and accessible form of long-term investment in unstable economic contexts (Bennett *et al*., 2019). Animals are sold during difficult periods when there is a need for cash. In the poorest households, chickens support this savings function: they are bartered locally for cereals. Unfortunately, regular epidemics (e.g. Newcastle disease) and wildlife attacks compromise the resilience of the household, and any efforts to intensify livestock production.

D.2. Way forward

Wild products (meat, fruits and vegetables) and domestic and wild animals are essential to the resilience of the households and to face the numerous constraints they have to overcome (ecological constraints, climatic events, lack of infrastructure, limited access to the work market, regular economic and financial crisis, COVID-19 pandemic, among others). Therefore, households' food security is highly sensitive to changes in access to wild areas and wild resources. Consequently:

- It is necessary to assess if the current consumption of small species (e.g. birds, squirrels, rodents, insects) is a threat to endangered species and needs to be more regulated or not.
- The development of the conservancy areas must not jeopardize access to wild fruits, vegetables and small species, since they are essential to support food diversity.
- Consideration should be given to a more detailed regulation of hunting of small species, in order to avoid criminalizing an activity that exists de facto and that plays a role in the nutritional health of the inhabitants.

E. Lessons learned and recommendations

The results show that the four dimensions of food security are problematic in KaZa: availability of food, access to food, safe and healthy utilization of food, and stability of food availability, access and utilization.

Local meat availability is limited and is decreasing. There is no available comprehensive local statistic to assess the local livestock size and the meat production (agricultural statistics are mainly available for vegetable products). Nevertheless, according to local informants, the

livestock population is decreasing due to repeated shocks (droughts, epidemics). Other sources (Fews Net, 2020) confirmed that many households have had to sell their animals as coping strategies to face repeated crises (economic, sanitary).

Food poverty is expected to increase in the area due to the increasingly poor macroeconomic conditions, consecutive droughts, and continued COVID-19 impacts.

Therefore, the challenge for the SWM Programme in KaZa is not just to increase the availability of meat that needs to be produced locally to address the local current need and to support the increase in the population. The main issue is to make it accessible to a population whose purchasing power and capacity for home production is highly limited. This requires ambitious support for local economic development. Moreover, as the market infrastructure is very limited, supporting the local production also requires supporting the market chains, from production to consumption.

According to the M&E framework of the SWM Programme in KaZa, there are two main objectives involving Result 4:

1. By the end of 2023, 80 percent of the households in the community conservancies are consuming three balanced meals per day throughout the year

Indicator: number of balanced meals per person and per year.

Means of verification: annual survey report. Regarding this first objective, and in relation to the number of meals per day, the study findings show that today, in Binga, only 20 percent of the households have three meals per day throughout the year (and 32 percent never do). Regarding the balance of the diet, they suggest that the quantity consumed at each meal is limited: indeed, to face scarcity, households first tend to limit the quantity consumed per meal, before reducing the number of meals. Moreover, the description of a food day shows that the diet is cereal-based and food diversity is limited, suggesting that the meals are not balanced.

2. By July 2023 "non-wild meat" meals represent 90 percent of households' habits

Indicators: (i) percentage of meals per month that include domestic meat, fish and forest food and; (ii) percentage of households practising sustainable extraction/collection/hunting/fishing.

Means of verification: consumption survey at baseline and endline.

The SWM Programme in KaZa findings show that currently, according to the surveyed households, wild meat represents 26 percent of their meat consumption on average in the year (and non-wild meat represents 74 percent). They also show that the category "wild meat" covers a high diversity of items (from large mammals to worms), and that the reduction in the consumption of some of these items should not necessarily be an objective. Consequently, this objective should be refined to focus on decreasing the consumption of large wild mammals and be rephrased as: By July 2023, "large wild mammals" meals represent less than 10 percent of household meals.

There is a need for further information. The ongoing socioanthropological study provides a broad understanding of the foodscape, food habits and food security issues. Some of this information needs to be completed for Nyawa. The implementation of a large quantitative survey is recommended to identify more precisely the socioeconomic profile and the

localization of the households that need to be targeted by the SWM Programme in KaZa. The socioanthropological research provides a strong basis for the implementation of such quantitative study (already in progress).

The quantitative survey (baseline and endline) needs to have the following objectives:

- Investigate how household characteristics (i.e. demography, wealth, ethnicity, employment, localization) correlate with household wild meat consumption.
- Estimate how wild meat contributes to household food security (frequency, 24-hr recall).
- Determine the provenance of wild meat consumed (i.e. own-caught, bought from traders/ markets, eaten as part of a village ceremony, etc.).
- Analyse the variation of wild meat consumption among the households.
- Analyse the variation of wild meat consumption among the members of households (men, women, children).
- Analyse the variation of wild meat consumption during the year (two contrasted seasons).

In relation to the first objective, it is recommended to assess the balance of the diet (rather than the balance of the meal as suggested by M&E framework of the SWM Programme in KaZa), based on the calculation of an individual food diversity score (ACF, 2011), for different individuals within a household (male, female, children).

In order to produce an annual survey of the situation, the implementation of a permanent observatory of a small sample of households with regular collection of their food diaries is suggested. This observatory will be used to monitor trends in food consumption and livelihoods during the time of the project. Moreover, this observatory will be useful to provide prompt answers to questions addressed by other Results (e.g. detail on fish consumption developed in Result 3) or for quick assessments of potential unexpected events (e.g. COVID-19 impact).

Summary

Population growth and changing landscapes bring people and livestock closer to wildlife, increasing interactions among people, wildlife and livestock, including conflicts and the exposure and risk of disease transmission between them. This chapter presents the current state of human–wildlife–livestock interactions at SWM Programme KaZa sites, which will help to offset the costs of coexistence with wildlife in three new community conservancies (CCs), namely Inyasemu (ICC) and Simalaha (SCC) in Zambia, and Mucheni (MCC) in Zimbabwe. The results presented are mainly based on baseline surveys conducted in the three CCs between 2019 and 2020. For human–wildlife conflicts, sets of prevention and intervention solutions have been identified but, given the limited number used, a major effort is needed to build the capacity of community members. With regard to health risk management, an innovative surveillance system in domestic and wild animals is proposed, combining genomic diagnosis with innovative real-time digital disease detection. At CC level, the implementation of a combined community-based surveillance system for human–wildlife conflicts and disease outbreaks, based on the use of mobile phones, is suggested.

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IX. HUMAN–WILDLIFE INTERACTIONS

Sébastien Le Bel, Ferran Jori, Vincent R. Nyirenda, Musso Munyeme, Tapiwanashe Hanyire, Muhammad Faizan Usman, Evans Nsende, Mike La Grange and George Mapuvire

Introduction

This chapter is concerned with human–wildlife interactions, which can be defined as the spatial and temporal juxtaposition of human and wildlife activities, where humans, wildlife or both are involved (Lischka *et al*., 2018). The studies, which provide socioeconomic information on hunting, fishing and consumption behaviours, are part of the R2 domain of the SWM Programme: *Management of wild species resilient to hunting and fishing is improved*. The objective of this chapter is to capitalize on the information collected on human–wildlife interactions by the SWM Programme in KaZa to inform future interventions. In addition to our findings, the aim is to analyse the local management capacity of dealing with such interactions and to assess whether

Materials and methods

To obtain all the information needed to propose recommendations and innovative approaches, the effort to be made is focused on the analysis of HWCs. To do this, four complementary approaches were implemented from April 2019 to September 2020:

- An analysis of previous literature enabled the SWM Programme team in KaZa to contextualize the results provided by the programme to distinguish approaches aimed at mitigating the negative impacts on the conservation of wild species and the maintenance of local communities' standard of living.
- Reports of field visits related to HWC hotspots were produced by wildlife experts and national and local authorities in charge of wildlife management.
- Field surveys were carried out to understand the perception of local communities about mobile data collection for establishing an HWC reporting and monitoring system. FPIC principles were applied during the interviews.
- Information on HWCs was gathered during household surveys between 2019 and 2020: in Inyasemu CC (initially, 2019 and extended from June to July, 2020), in Mucheni CC (January–March 2019) and in Simalaha CC (initially, 2019 and extended from June to July, 2020). Prior to household surveys, theory of change workshops were conducted in 2018 and modified in December 2019. With regard to HWC, a section of the questionnaire of the household survey collected the following information:
    - experiences of HWC in the last 12 months;
    - the nature of the conflict & types of damage caused by wildlife;
    - the incriminated species;
    - the season of damage & frequency of damage;
    - the extent of the damage;
    - the location of damage; and
    - The mitigation strategy and solutions being utilized.

they constitute an obstacle to the development of sustainable wildlife management plans as it is expressed in the site theory of change. This chapter is organized in two sections: one dealing with human–wildlife conflicts (HWCs) in the three community conservancies (CCs), and the other addressing ways to monitor and mitigate wildlife disease risks and their transmission to rural communities and their livestock.

A. Human–wildlife conflicts

Wildlife is a common resource, but its negative value, such as the conflict between humans and wildlife, overshadows its positive values/services related to conservation and local development prospects. HWCs are complex and result from a combination of human activities, such as unprecedented expansion of human settlements and inappropriate land-use practices, as well as the problematic behaviour of certain wildlife species. Managing HWCs and maintaining an acceptable level of coexistence is a difficult task, requiring interdisciplinary technical understanding of these dynamics to be able to design successful strategies and projects, and assemble effective transdisciplinary teams and long-term collaborations (IUCN, 2020).

A.1. Context

A.1.1. Kavango-Zambezi Transfrontier Conservation Area

HWC is one of the most pressing conservation issues across the Kavango-Zambezi Transfrontier Conservation Area (KaZa-TFCA), where a significant number of people live in a wildlife area (see Chapter II). Key findings of an HWC review conducted in 2016 (Karidozo *et al.*, 2016) highlight the following: (i) Common consequences from HWCs include crop destruction, property damage, human and wildlife death or injury; (ii) Problematic species are elephant (*Loxodonta africana*), lion (*Panthera leo*), spotted hyena (*Crocuta crocuta*), Nile crocodile (*Crocodylus niloticus*) and hippopotamus (*Hippopotamus amphibius*); (iii) Traditional mitigation methods are not efficient and sustainable; (iv) There is a general lack of capacity to mitigate HWCs and these are poorly monitored; and (v) Reducing the intensity of HWC demands a holistic approach to address the root causes of it. KaZa-TFCA has a strategy for reducing crop and livestock damage by wildlife encounters which is still not satisfactory to stakeholders. Nonetheless, technical and social issues are working well in some areas, such as Namibia and Botswana, because villagers are getting adequate benefits from their wildlife (Karidozo *et al.*, 2016). In addition, the KaZa-TFCA is considered a hotspot for the circulation of transboundary animal diseases (TADs) such as foot-and-mouth disease (FMD), bovine tuberculosis (BTB), rabies, brucellosis or anthrax among the five countries due to the free circulation of wildlife populations, some of which are reservoirs of infectious pathogens affecting animal or human health.

A.1.2. Zambia

Zambia, as one of the partner countries of KaZa-TFCA, is also experiencing HWC in the form of crop and property damage, and livestock and human attack which sometimes lead to loss of human life. Most HWCs are in settlements expanding around and/or in wildlife dispersal routes (Karidozo *et al.*, 2016). In the terrestrial environment the problem-causing wild animals include elephants, lions, spotted hyenas, vervet monkeys (*Chlorocebus pygerythrus*), chacma baboons (*Papio ursinus griseipes*) and Cape buffaloes (*Syncerus caffer*), while in freshwater environments,

they are Nile crocodiles and hippopotamus (Nyirenda *et al.*, 2011; Gross *et al.*, 2019; Tembo *et al.*, 2020). Social impact of HWC includes its influence in the homestead arrangements, where villages tend to cluster for protection and reinforcement against wild animals. Ecological importance of HWC encompasses restriction of wildlife movements and dispersal by countermeasures such as fencing, use of chilli and traditional methods (e.g. chasing, shouting and use of fire) and road kills (Nyirenda *et al.*, 2017). Due to sheer scale and intensity, HWCs also contribute to political issues in wildlife hotspots, such as Luangwa, Kafue and Zambezi (KaZa-TFCA's Zambezi Chobe Dispersal area) landscapes of Zambia. Against the HWCs, Zambia has no compensation policy for the losses directly or indirectly incurred by humans. However, a combination of non-lethal HWC interventions and awareness-raising are encouraged to cushion the vulnerable people and wildlife (Nyirenda *et al.*, 2018).

A.1.3. Zimbabwe

HWCs in Zimbabwe are one of the major challenges facing marginalized communities, especially those living in areas adjacent to protected areas. Human population increases in areas adjacent to protected areas, and the resultant encroachments into protected areas, as well as increasing livestock populations, have been reported to result in increases in HWCs. HWCs are multifaceted as they can directly affect most of the livelihood assets of the communal people. Some of the conflicts include destruction of crops and thatched houses, people getting killed or maimed and loss of livestock. Recognizing the magnitude and frequency of occurrence of HWCs and the livelihood repercussions thereof, the Government of Zimbabwe initiated a Human and Wildlife Policy Development Process led by Zimbabwe Parks and Wildlife Management Authority (ZPWMA). The proposed Policy Statement was that the "livelihoods of rural communities are secure and their well-being is not compromised through coexisting with wildlife". This shall be achieved through striking a balance between the need for developing community livelihoods and conservation of wildlife resources (Zhuwao *et al.*, 2019).

A.2. Key results

The aim is to report on the current state of HWCs in the three CCs, specifying the nature of the conflict, species involved, the impact of HWCs at CC (villages and households) levels, their spatial and temporal specificities, the social perception of HWCs, the strategy and utilized measures for HWC mitigation.

A.2.1. Types of human–wildlife conflict

A.2.1.1. Common features

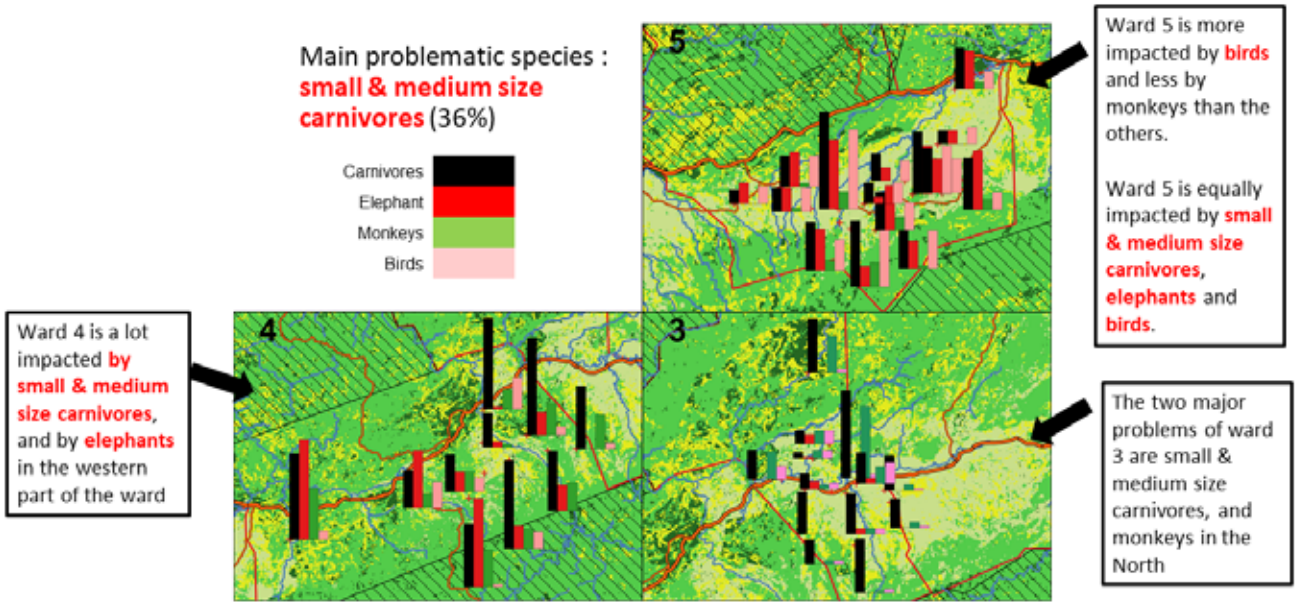
Due to the similarities in landscape and geography, most of the species that frequently come into conflict with humans are common among the three CCs. In particular, conflicts occurring in ICC and SCC are dominated by the same species due to the two conservancies being adjacent to each other and sharing a common geography. Some of the conflict species common to all three conservancies include elephants, hippopotamus, chacma baboons, vervet monkeys, spotted hyenas, leopards, lions, Nile crocodiles and bushpigs (*Potamochoerus larvatus*). Birds such as helmeted guinea fowls (*Numida meleagris*) and red-billed quelea quails (*Quelea quelea*) are also common causes of these conflicts. Herbivores and birds are mainly responsible for crop raiding and damages, whereas carnivores frequently attack domestic animals, incurring huge

livelihood losses to the communities living in the three CCs. Moreover, apart from livelihood losses, communities in these conservancies are in constant fear since these animals force them to perceive the presence of wildlife negatively.

A.2.1.2. Mucheni CC (MCC)

Based on the observations made during the survey in 2019, the main impact of HWC at household level remains livestock predation (44 percent), followed by crop destruction (33 percent), fear/ disturbance (17 percent), diseases (4 percent), human casualty (2 percent) and destruction of infrastructure (0.3 percent). The main identified problematic species were small and medium-sized carnivores such as black-backed jackals (*Canis mesomelas*), and spotted hyenas (36 percent), followed by other species such as elephants (15 percent), granivorous birds such as red-billed quelea quails (13 percent), chacma baboons (12 percent), big carnivores such as lions and leopards (10 percent), respectively (Figure IX.1). According to the respondents, conflicts with big carnivores, monkeys, small and medium-sized carnivores and snakes occur year-round with a slightly varying seasonal pattern, whereas birds are mainly a problem from February to June and conflicts with elephants mainly occur from January to June (Le Bel and Usman, 2020).

Figure IX.1: Main problem species and localization in the three wards of MCC reported in 2018 – Information extracted from the household survey conducted in 2019 (*Source:* Authors)


Main problematic species : small & medium size carnivores (36%)
Carnivores
Elephant
Monkeys
Birds
5
4
3
Ward 5 is more impacted by birds and less by monkeys than the others.
Ward 5 is equally impacted by small & medium size carnivores, elephants and birds.
Ward 4 is a lot impacted by small & medium size carnivores, and by elephants in the western part of the ward
The two major problems of ward 3 are small & medium size carnivores, and monkeys in the North

A.2.1.3. Inyasemu CC (ICC)

There is sustained and increasing crop damage by herbivores (elephant, hippopotamus, blue wildebeest [*Connochaetes taurinus*]) and monkeys [chacma baboon and vervet monkey]). Other problem animals are bushpigs, common duikers (*Sylvicapra grimmia)*, porcupines (*Hystrix africaeaustralis*), and rats (*Rodentia*). Weavers *(Ploceidae*), guinea fowls, red-billed quelea quails and partridges *(Perdicinae*) are common avian problem species. The crop damage spikes during crop farming season from February to April, exacerbated by damage from birds (Chibesa, 2020).

However, in recent years red locusts (*Nomadacris septemfasciata*) have become more prominent problematic species. Livestock is predated by hyenas, lions, leopards, civets (*Civettictis civetta*), Nile crocodiles and snakes all year round (Nyirenda, 2020).

From the baseline study conducted in 2019, the most adverse effect of the HWCs in the study area was the killing of domestic animals by predators (46 percent), such as the hyenas. The number and type of domestic animals killed by wildlife varies according to the species (which are mostly goats, chickens and on rare occasions calves), time of year (July to April), and availability of natural prey around the villages. Crop damage (37 percent) was also cited as one the most prevalent forms of HWCs across the entire CC proposed area (Banda *et al.*, 2019).

However, various forms of HWCs seem to impact humans in several ways. Among the reported impacts, direct impacts include crop and livestock damage, and occasionally loss of life. Other impacts include property damage, such as damage to infrastructure like water points and houses. Hidden impacts include inducement of fear (12 percent), resulting in opportunity costs and slow performance among school pupils.

A.2.1.4. Simalaha CC (SCC)

There is a slight variation between ICC and SCC. Crop damage is experienced by the same species. Little is reported on predators as problematic species in SCC, with the exception of Nile crocodiles and snakes all year round (Nyirenda, 2020). A full study has yet to be conducted on the impacts of HWC in SCC as well. Although some measures have been promoted, such as wire fencing, there are still some crop damage incidents being reported. Fear of problematic species is among the indirect impacts cited in SCC.

A.2.2. HWC impacts and consequences

A.2.2.1. Common features

HWCs are causing negative impacts by damaging and destroying assets which communities depend on. Due to few available resources, especially during the dry season, humans and wildlife tend to compete for water and food resources. This competition has negative impacts for both humans and wildlife because one or the other get injured or killed in the process. Local communities are also developing a negative perception towards wildlife and conservation because they feel that the benefits of living with wildlife do not outweigh the negative impacts and consequences experienced. Such negative interactions between humans and wildlife have led to a few individuals resorting to violence and seeking revenge by killing wildlife, often killing species that do not have conflicts with humans. This incurs huge problems for conservation of wildlife as well as livelihoods of the communities that have to share the habitat with these animals. Especially in cases where an entire crop field is destroyed overnight by mega-herbivores, such as elephants, or a significant number of livestock are predated by medium and big carnivores, this leads to severe food insecurity for the affected households. In cases where the breadwinner of a household gets injured or killed by wildlife, it can disrupt the entire livelihood dynamic for that household. Hence, even if HWCs are occasional and do not happen every day, once they occur, they can have huge implications for local communities which may last even longer than a year.

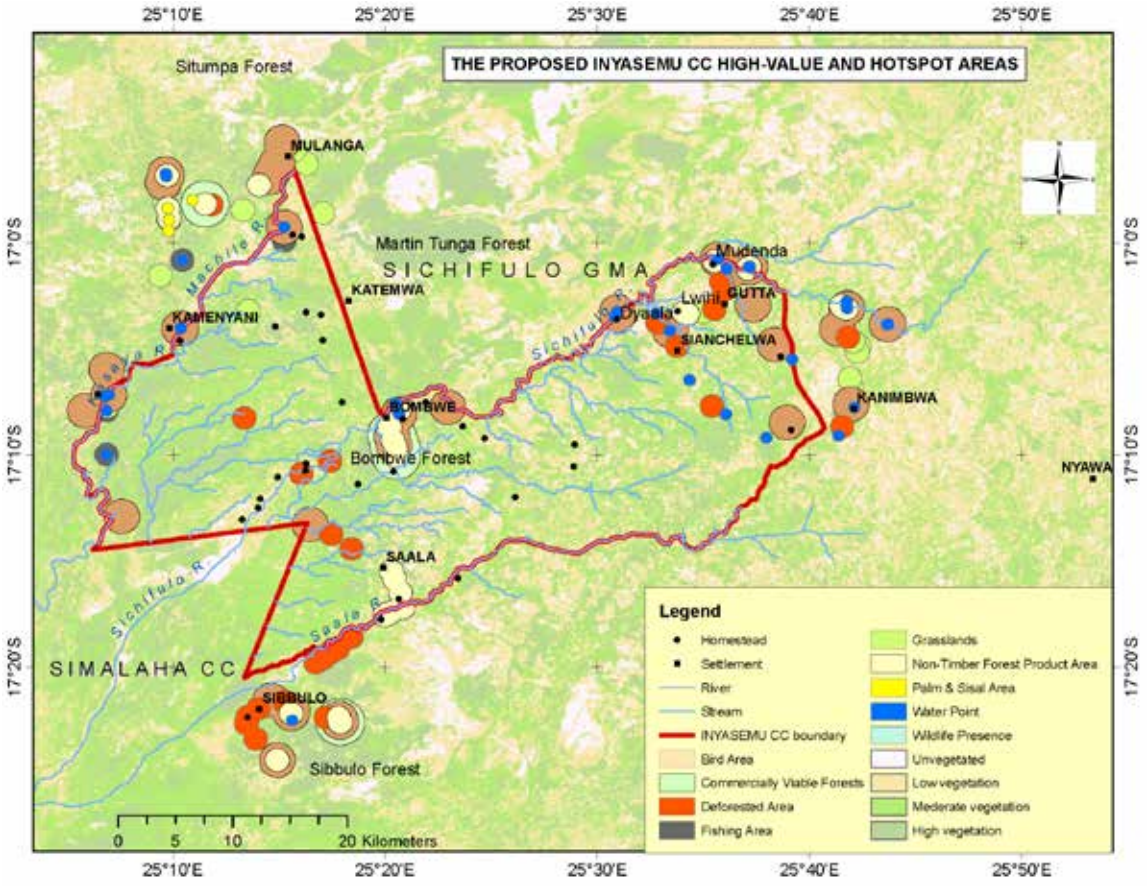
A.2.2.2. Mucheni CC (MCC)

According to the results of the SWM Programme's 2019 household survey, the majority of respondents (95 percent) declared that they have been affected by an HWC event in the last year. Despite HWC incidents being occasional, whenever they occur, they leave a significant impact on the livelihoods of the affected communities. HWC occurs mainly in grazing areas (55 percent), kraals (54 percent), field crops or fallows (48 percent) and homesteads (47 percent). Incidents in forests (31 percent) and near water points (28 percent) are less frequent but can be significant for some species (Le Bel and Usman, 2020). Areas where these conflicts take place depend on the type of animals causing the conflict. For example, conflicts with big carnivores occur mainly close to kraals, grazing areas, homesteads and forests, whereas elephants come into conflict with communities mainly in crop fields and fallows, but also sometimes in the forest and grazing areas. Birds and wild pigs are mainly a problem in crop fields and fallows. Conflicts with monkeys and snakes are widely distributed spatially, so they are a constant threat irrespective of the place.

A.2.2.3. Inyasemu CC (ICC)

All interviewees had experienced at least one form of HWC event in 2019. Such events are not so frequent in the area, but collectively occur on a wide scale. The HWC hotspots in the area are Saala, Bombwe, Sianchelwa and Nyawa (Figure IX.2). The most destructive reported effect of these conflicts is crop and livestock damage, which leads to huge losses for local communities that depend on agriculture for their livelihoods.

Figure IX.2: High value areas and HWC hotspots in the ICC (*Source:* Authors)



On-farm crop damage is usually caused by herbivores and birds, mostly during the crop farming season (February to April). Unprotected dry season gardens situated along perennial streams are also scattered. Rodents incur further damage to stored food throughout the year. Livestock damage by predators such as hyenas also occurs throughout the year, mostly in and close to kraals, grazing areas and forests. Diseases, such as anthrax and African swine fever, are transmitted at the water points, especially during the dry months from September to October (Nyirenda, 2020).

A.2.2.4. Simalaha CC (SCC)

As in ICC, all interviewees had experienced at least one type of HWC incident in 2019. Since SCC is located adjacent to ICC and shares the same landscape and geography, it has a similar pattern of HWC interaction, but with more conflicts, mainly livestock predation, reported along the Zambezi River where there is a high concentration of human activities. Herbivores and birds damage crops from February to April, whereas water points are damaged by various animals searching for water, mainly during the dry season from August to November when water becomes scarce (Nyirenda, 2020).

A.2.3. HWC mitigation framework

A.2.3.1. Common features

To formulate an HWC mitigation strategy[1] for each CC, it is important to consider the distinct characteristics of each of them. A common mitigation strategy cannot be rolled out because expectations of the communities and the local perception towards wildlife can differ significantly from one conservancy to the other. Hence, a participatory approach, respecting Free, Prior and Informed Consent (FPIC) principles, was undertaken in each conservancy with district and local-level stakeholders. Discussions and brainstorming activities were conducted to understand the local needs and context in terms of HWCs. All stakeholders highlighted their expectations and capacities to deal with the HWC issues faced by communities. Formulation of local strategies help set realistic goals and targets that stakeholders can expect to achieve by 2024.

A.2.3.2. Mucheni CC (MCC)

Formulation of the mitigation strategy[1] was a participatory process with representatives from the community (ward and village committees), Binga Rural District Council (BRDC), Forestry Commission, Agricultural Technical and Extension Services (AGRITEX) and Chizarira National Park. The kick-off workshop was organized in Binga, Zimbabwe, from 16 to 19 July 2019. The overall objective of the workshop was to improve coexistence between community and wildlife by the year 2024. As a result of the workshop, the following objectives, and their respective indicators, were developed, which are realistically achievable by 2024 (Mapuvire, 2019):

- reducing crop destruction from 40 percent to 10 percent by promoting conservation agriculture, enabling households to protect their crops effectively and minimizing crop destruction due to proper zoning;
- reducing livestock predation from 4 percent to 2 percent by enabling households to protect their livestock and adopt improved livestock management;

[1] For clarification, mitigating HWC means reducing the impact of HWC by combining: (i) preventive measures to be applied before or after the conflict (reducing risk, increasing social carrying capacity); and (ii) intervention measures to use during the conflict (blocking access, chasing away, removing problem animals).

Figure IX.3: Traditional thorn/pole fencing to prevent the intrusion of carnivores in night bomas (left) and herbivores into crop fields/vegetable gardens (right) (© V. Nyirenda)

- strengthening coordination efforts for HWC prevention;
- reducing wildlife poaching by half with efficient reporting of wildlife-related activities in place and by informing communities about wildlife conservation, HWC and illegal activities.

A.2.3.3. Inyasemu CC (ICC)

The mitigation strategy process was conducted through broad participation by multiple actors, *inter alia,* community representatives. The goal of HWC Management Strategy for ICC emerged as follows (Nyirenda, 2020): "To restore and secure connectivity of viable wildlife populations and maintain habitat integrity across the Inyasemu Community Conservancy in a 10-year period (2021–2031) for better biodiversity conservation and local wildlife-based livelihood benefits". To meet this goal, a proposed strategy that still needs to be approved by the CC stakeholders comprises four objectives:

- safeguarding the local communities and wildlife integrity through effective conservation planning;
- enhancing decision-making by the local communities and their partners through science-based approaches, information management and technology;
- attracting, maintaining and enabling partnerships for more effective HWC management; and
- empowering communities to establish and implement mitigation measures and sustainable livelihoods actions.

A.2.3.4. Simalaha CC (SCC)

A mitigation strategy was also conducted in 2016 through broad participation by multiple actors, *inter alia,* community representatives (i.e. chiefs, indunas and village headmen) under the Sekute Community Trust, Peace Parks Foundation, Department of National Parks and Wildlife, Department of Fisheries, and Forestry Department, within the broad framework of an integrated development plan (Peace Parks Foundation, 2016).

A.2.4. HWC mitigation tools and their monitoring

A.2.4.1. Common features

Mitigation measures applied mainly depend on the type of animal involved in the conflict and the place where it occurs. Currently, most of the measures used are based on traditional knowledge, including:

- chasing away the intruding animal using drums, shouting, fires;
- guarding the fields;
- blocking access to the carnivores by fencing (or ropes).

Wildlife-repelling agricultural practices and land-use planning are rarely applied due to lack of awareness, funding, skills and adequate training. Some individuals also resort to retaliation killing when the animal causes human casualties and when crops are destroyed, or livestock predated.

A.2.4.2. Mucheni CC (MCC)

According to the results of the SWM Programme's 2019 household survey, mitigation measures applied in the MCC are limited to chasing away intruding animals (91 percent) and blocking the access to carnivores (60–64 percent). Adapting existing land use plans and specific agriculture practices remains rare (11–14 percent). Retaliation killing in case of human casualties or crop destruction is considered by more than half of the respondents as a normal practice. When respondents were asked about their opinion about retaliation killing, 53 percent stated that such animals should be killed when they threaten a human being, whereas 55 percent stated that such animals should be killed in case of crop destruction as well, since it seriously impacts the livelihoods of the victim households. To understand the drivers of tolerance as well as local perception about the mitigation of HWC, a pilot study was conducted in Ward 4 of MCC. Based on the results of the study, 85 percent of the respondents claimed that HWC reporting is an issue in their villages and there are instances where these incidents are never reported, especially when the intensity of the conflict is not severe. Moreover, 70 percent of the respondents mentioned that the wildlife authorities either take too long to respond or never respond at all. These percentages highlight the inefficiency of the current HWC reporting and monitoring system, which therefore needs to be improved.

In the neighbouring districts of MCC, forty-eight (48) different tools were reviewed and catalogued to mitigate HWCs. Ways of improving existing tools were identified to simplify their production and utilization. Assessing existing HWC mitigation projects highlighted the importance of promoting better understanding of where to place tools to provide for best long-term protection strategies (La Grange and Bonnici, 2018).

A.2.4.3. Inyasemu CC (ICC)

In the absence of district integrated development plans, as well as general management plans and strategy, mitigation measures are limited: 15 percent of the sample indicated chasing away as the only mitigation measure for problematic animals (e.g. shouting, drumming, use of fires, and human images), while 85 percent indicated that in a matter of life and death, they would kill the animal, and in many cases, authorities are notified. Some respondents report the use of thorn/pole fencing to prevent the intrusion of carnivores in night bomas (Figure IX.3), and protect their crops (Nyirenda, 2020).

Figure IX.4: Example of game fence which is preventing free movement of wildlife (© V. Nyirenda)

A.2.4.4. Simalaha CC (SCC)

The integrated development framework (Peace Parks Foundation, 2016) emphasizes use of multiple solutions to HWCs, which include the use of fence lines (Figure IX.4) and boreholes. However, mitigation measures still widely practised are largely chasing away the problem animals and use of thorn fences to prevent their access. Participants perceive that more should be done by the local communities to better protect their crops, livestock and, more importantly, themselves.

A.3. Way forward

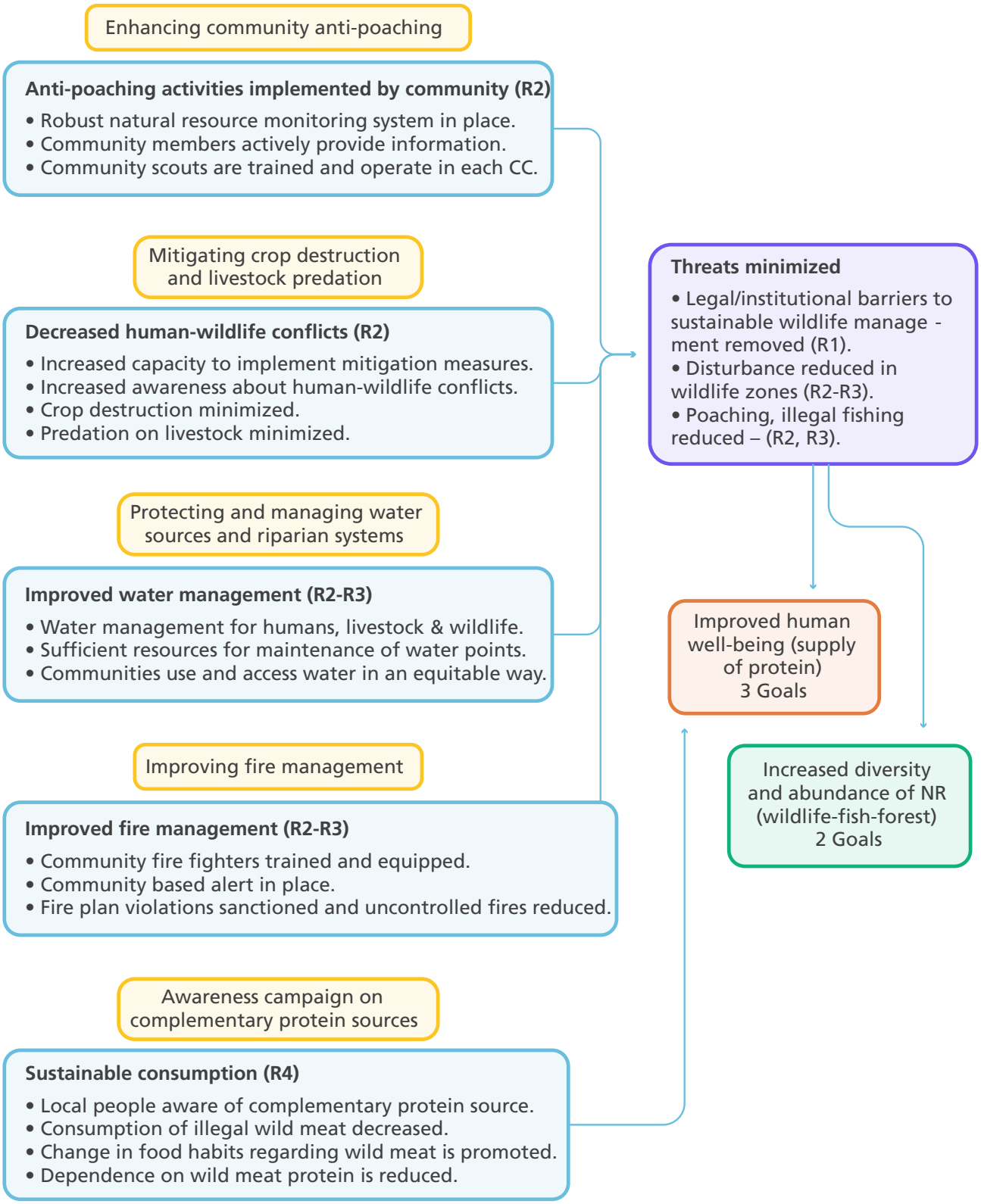
A.3.1. Lessons learned

The baseline surveys conducted in the three CCs confirmed the social and economic footprint of HWCs. As reported in KaZa-TFCA, Zambia and Zimbabwe, HWCs are an ongoing threat to people living side by side with wildlife and also for wild animals being killed in retaliation. Characterized by marked spatial and temporal patterns, HWCs result in significant damage to food crops and livestock. While there is a range of wild species responsible for HWCs, the damage caused by protected species, such as elephants and carnivores, predominates. Unsurprisingly, there are no adequately designed mitigation strategies in place at the local level and the solutions being deployed are few, partially implemented and of little-known effectiveness. The lack of functional information systems limits efforts to understand what are the deep root causes of HWCs, to monitor their seasonal and geographic patterns, and to assess the impact of locally based mitigation strategies and solutions. The socioeconomic cost of HWC is high. Even though the level of tolerance towards wildlife has not been evaluated yet in each CC, the persistence of HWCs appears to be one of the serious constraints, with water, fire management and anti-poaching, to conservation efforts as explained in Chapter III with the KaZa site theory of change. Figure IX.5 provides a focus on HWC.

A.3.2. Recommendations

An HWC mitigation strategy is critical for long-term success in the conservation and management

Figure IX.5: SWM Programme in KaZa theory of change applied to Result 2 displaying the importance of mitigating HWC (*Source:* Authors)


Enhancing community anti-poaching
Anti-poaching activities implemented by community (R2)
• Robust natural resource monitoring system in place.
• Community members actively provide information.
• Community scouts are trained and operate in each CC.
Mitigating crop destruction and livestock predation
Decreased human-wildlife conflicts (R2)
• Increased capacity to implement mitigation measures.
• Increased awareness about human-wildlife conflicts.
• Crop destruction minimized.
• Predation on livestock minimized.
Protecting and managing water sources and riparian systems
Improved water management (R2-R3)
• Water management for humans, livestock & wildlife.
• Sufficient resources for maintenance of water points.
• Communities use and access water in an equitable way.
Improving fire management
Improved fire management (R2-R3)
• Community fire fighters trained and equipped.
• Community based alert in place.
• Fire plan violations sanctioned and uncontrolled fires reduced.
Awareness campaign on complementary protein sources
Sustainable consumption (R4)
• Local people aware of complementary protein source.
• Consumption of illegal wild meat decreased.
• Change in food habits regarding wild meat is promoted.
• Dependence on wild meat protein is reduced.
Threats minimized
• Legal/institutional barriers to sustainable wildlife manage - ment removed (R1).
• Disturbance reduced in wildlife zones (R2-R3).
• Poaching, illegal fishing reduced – (R2, R3).
Improved human well-being (supply of protein) 3 Goals
Increased diversity and abundance of NR (wildlife-fish-forest) 2 Goals

of wildlife. A holistic approach at landscape level that addresses root causes over the long term, as well as short-term mitigation, will pave the way for the CC adoption and development. The recommended objective is to move from a logic of conflict management to a policy of coexistence (Carter and Linnell, 2016) by setting up locally designed platforms for the management of HWCs. The aim is not to eliminate all conflict, but to reduce it to an acceptable level (social tolerance) by taking into consideration the needs and expectations of the affected communities.

At the scale of each CC, the strategy is to propose, organize and promote an intervention frame enabling: (i) the analysis of HWCs at CBOs/village levels to establish a diagnosis of the situation; (ii) the co-construction with local players of mitigation strategy built on traditional knowledge; (iii) the implementation of mitigation measures through the access of smart tools, measures or solutions with ad hoc trainings for capacity building; and (iv) the facilitation of a monitoring system, allowing a collaborative learning process for adaptive management.

To achieve this, an HWC platform (HWC-P) will be set up for each CC. Designed for usefulness and adaptability, the HWC-P aims to address and articulate at the same time the needs of the manager in charge of conservation issues and of addressing the political burdens of HWCs and those of individuals or CBOs who are supporting the costs of living with wildlife. Such a sociotechnical device will ease the access to user-friendly mitigation solutions through an application (E-toolkit), facilitate its use by local communities in the light of legal and institutional frameworks, and improve the local capacity of adaptive management through information services being generated by the HWC-P. Three steps should be articulated in a timely manner as described below.

A.3.2.1. Understanding the needs and expectations of the targeted audiences

Moving from addressing conflicts to promoting coexistence demands launching a process of behaviour changes supported by a smart communication strategy. In line with this, an initial analysis of stakeholders' expectations, information needs but also contributions to HWC mitigation, is paramount. The following feedback from a consultation process in MCC (Mapuvire, 2019) gives an idea of the diversity of stakeholders to be involved and their expectations and needs.

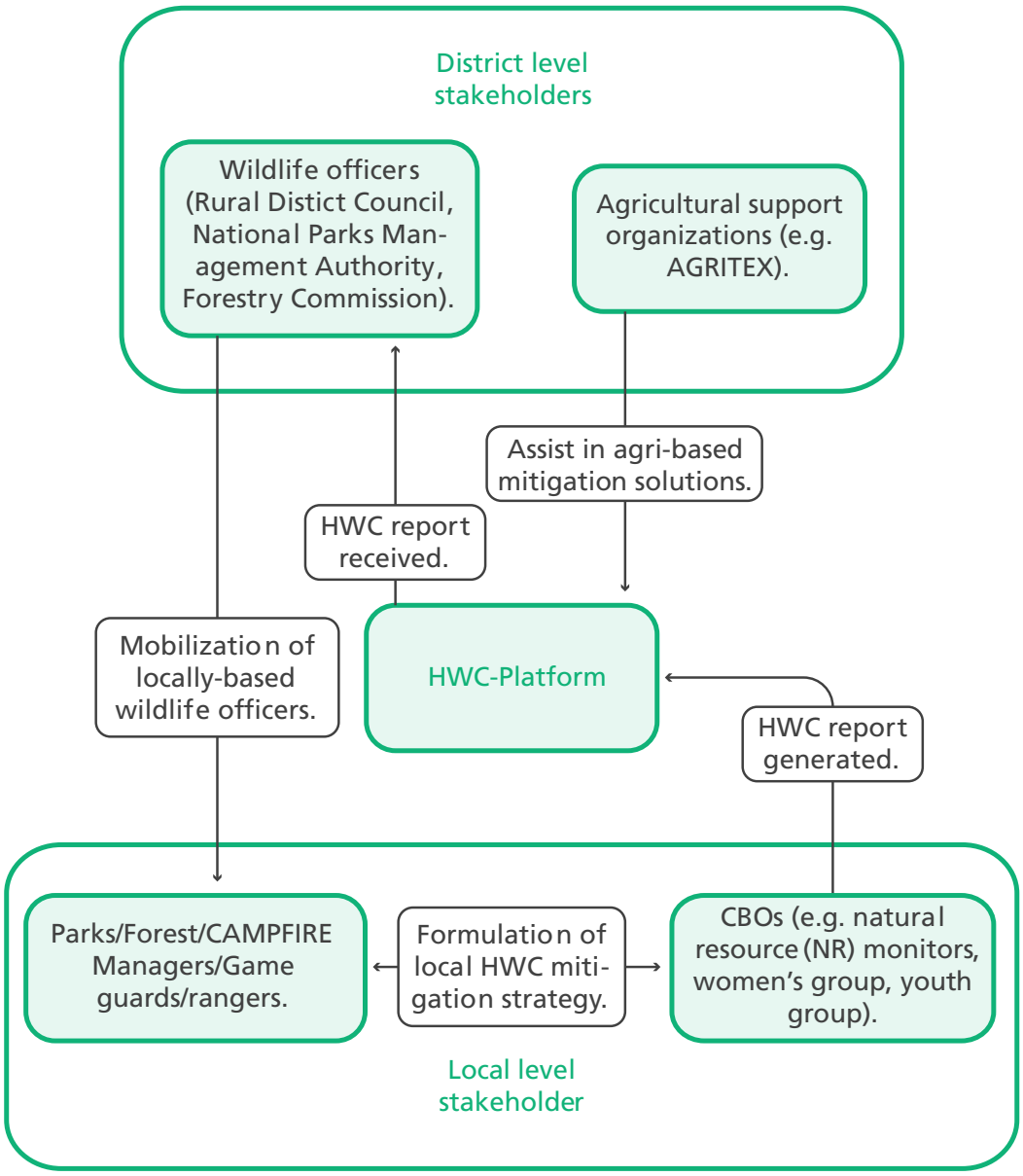
At district level: District Council (Zambia), Rural District Council (Zimbabwe), Parks and Wildlife Management Authority: ZimParks (Zimbabwe), Department of National Parks and Wildlife (Zambia), Forestry Commission (Zimbabwe), Forestry Department (Zambia), conservation organizations, Environmental Management Agency, agricultural support organizations, etc.

- Expectations: fewer complaints, improved reporting, better land-use planning, reduced poaching, less encroachment, reduced deforestation, improved coordination, increased awareness, HWC resistant crops
- Information needs: improved reporting and decision-making, identification of hotspots, HWC-related information sharing

At local level: traditional/local leaders, women's groups, ward councillors/chiefs, ward/village committees, community/villagers, RDC rangers (BRDC substations), game guards, youth groups.

- Expectations: less damage from HWC, women's participation, improved wildlife management, fewer complaints, reduced poaching, youth participation, training for wildlife management

Figure IX.6: Flow of information between decision-makers and the concerned community members via the HWC-P (*Source:* Authors)

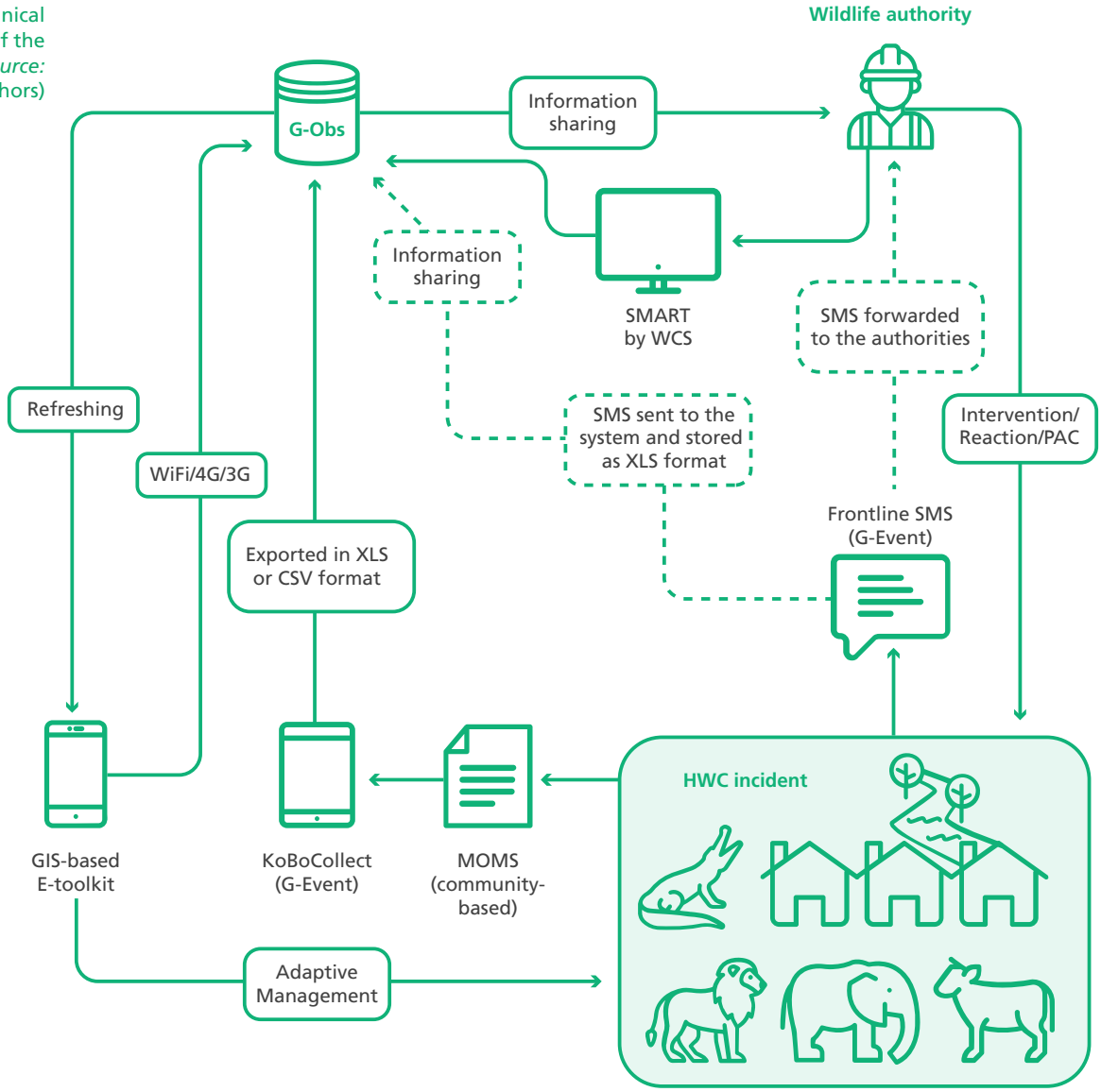

District level stakeholders
Wildlife officers (Rural Distict Council, National Parks Management Authority, Forestry Commission).
Agricultural support organizations (e.g. AGRITEX).
Assist in agri-based mitigation solutions.
HWC report received.
Mobilization of locally-based wildlife officers.
HWC-Platform
HWC report generated.
Parks/Forest/CAMPFIRE Managers/Game guards/rangers.
Formulation of local HWC mitigation strategy.
CBOs (e.g. natural resource (NR) monitors, women's group, youth group).
Local level stakeholder

- Information needs: HWC mitigation solutions

A.3.2.2. Establishing an operational framework for locally based mitigation strategies

The conceptual design of the HWC-P is a hub facilitating the flow of information between decision-makers and the concerned community members (Figure IX.6) once the roles and responsibilities for each stakeholder have been defined with reference to their needs and expected contributions to the HWC platform. The platform will build local capacities to deal with HWC incidents on their own; wildlife officers will collaborate with the locally-appointed natural resources (NR) monitors and other concerned members of CBOs to design and implement HWC mitigation strategies best suited to the local scenario. Moreover, the role of traditional and political leaders is pivotal to influencing the local communities to play their part in formulation of the HWC strategy.

Figure IX.7: Technical architecture of the HWC-P (*Source:* Authors)



Whenever an HWC incident occurs, NR monitors appointed by CBOs will report the incident to the HWC-P using existing or newly developed tools/channels (Figures IX.6 and IX.7). Upon receiving the complaint, district level wildlife authorities will mobilize local-level wildlife officers to report on the site where the HWC incident occurred. Wildlife officers will then collaborate with NR monitors and other concerned members of CBOs to decide on locally based HWC mitigation solutions to be applied. Over time, with more and more HWC incident reporting and interventions, the existing/foreseen locally designed HWC mitigation strategy will be adjusted/formulated, the implementation for which the local communities are responsible. If a lethal action (problem animal control) is required to eliminate a dangerous animal, the decision is to be taken by the wildlife authorities.

A.3.2.3. Operationalizing new and existing tools for an operational adaptive management system

The technical architecture of the HWC-P shows how the key stakeholders using different tools

Figure IX.8: Examples of bomas promoted in MCC to protect livestock from predators: semi-permanent boma designed for mixed herds (left) and small mobile boma for small herds (right) (© M. La Grange)

will be responsible for establishing a feedback loop for sharing information about HWC incidents and providing adequate solutions to reduce the impact of HWC at CBO levels (Figure IX.7). Three categories of tools will be utilized:

- **Informing decision-makers**: when a conflict occurs, an alert system (such as Frontline SMS or WhatsApp) will first alert decision-makers in a timely manner. Other data collection systems, either paper-based such as MOMS or electronic-based such as SMART or KoBoCollect, facilitate the procedures to collect and manage data resulting from the observation of HWC (Le Bel *et al.,* 2016).
- **Receiving, storing and transforming data flows into information services**: a new-design web interface G-Obs built on QGIS and LizMAP open-source softwares will package the information requested by the different categories of stakeholders (each service having its

Table IX.1: List of preventive and intervention measures according to the targets and objectives of intervention (*Source:* Authors)

Targets and objectives of intervention	Preventive measures		Intervention measures		
	Reducing risks	Increasing Social Carrying Capacity	Blocking Access	Chasing Away	Removing Problem Animal
Human involvement					
Increase tolerance		Compensation Insurance Lion guardian Moral incentives	All fences		
Values and perceptions of wildlife		Education tools Sharing experience			
Wildlife behavioural understanding		Tracker School programme			
Food security & Livelihoods	Alternative crop Livestock husbandry	Herding project Infrastructure Insurance	All fences		
Safety issues and health	Mobile phone Watchtower	GPS collaring	All fences Guard dogs		Problem animal control Translocation Trapping
Well-being and social costs		Moral incentives			
Political issues		Mediation Moral incentives			Problem animal control
Alert	Mobile phone Watchtower			Cow bell	
Management & Implementation	Mobile phone communication	Herding Project Learner professional hunter Lion guardian Mediation	Virtual fencing		
Wildlife conservation					
Decrease attractiveness of the environment for wildlife	Alternative crops Zoning		Removing carcasses		
Decreasing pressure on wildlife	Zoning	Understanding animal behaviour	Virtual fencing		Translocation
Wildlife management	Mobile phone	GPS collaring Trackers Understanding animal behaviour	Virtual fencing		Management quota Translocation Problem animal control
Crop protection					
Protect crop		Learner professional hunter	Guard dogs Fences Bee Fences Chili strings	Chili tools Noisemakers Lights Motorised crew	Translocation
Reduce attractiveness	Alternative crops Zoning		Granaries Virtual fencing		
Livestock protection					
Protect livestock		Community Herding Project Lion guardian	Guard dogs All fences Predator lights Mobile boma	Lights Noises Torches	Translocation
Reduce attractiveness	Zoning Husbandry				
Properties, housing & equipment protection					
Protect housing & equipment			All fences Loosing rocks Trenches	Chili tools Lights Noises	Translocation
Reduce attractiveness of housing & equipment	Zoning		Virtual fencing		

own clients).

- **Choosing adequate mitigation measures**: G-event, a newly designed application for smartphone or tablet, will function as a decision support system. When activated by a wildlife expert, G-event will make it possible: (i) to establish a quick diagnosis of the local HWC context by recording all recent HWC events and to position them on a map; (ii) to select the most appropriate solutions from a list of tools grouped in two categories of measures: preventive measures to be applied before or after the conflict (reducing risk, increasing social carrying capacity) and intervention measures to use during the conflict (blocking access such as bomas (Figure IX.8), chasing away, removing problem animals) (Table IX.1).

B. Animal and human health

Community conservancies targeted by the SWM Programme in KaZa are part of the KaZa-TFCA. As such, they are more likely to be exposed to transboundary animal diseases (TADs) and their pathogens from neighbouring countries due to the lack of harmonization between different disease surveillance systems. Additionally, TFCAs face increased opportunities for transmission of pathogens among wildlife, livestock and human populations, if they come across susceptible or naive populations (Thomson *et al.*, 2013).

The identification of activities to address this challenge was considered in the programme document (R2.3.A1: Assessment of the relevant risks for humans and livestock linked to wildlife and fish utilization). The first activity considered was to perform an inventory of the ongoing knowledge and activities in terms of surveillance of pathogens circulating at the wildlife–livestock–human interface (WLHI). Indeed, a considerable number of research activities in this field have been developed over the last 30 years by CIRAD within the framework of the Research Platform – Production and Conservation in Partnership (RP-PCP). Unfortunately, no activities could be initiated in Year 2 of the SWM Programme in KaZa due to the COVID-19 situation. This diagnostic phase of the health situation is still planned for 2021–2022.

Materials and methods

In order to propose recommendations and innovative approaches to improve monitoring, prevention and response capacity to health risks circulating at the wildlife–livestock–human interface in the three CCs, two complementary steps have been followed:

- an analysis of previous literature and data available in order to establish baseline information on unselected wildlife-borne pathogens affecting human or animal health in the three CCs. Because this information is rather scarce, information from other surveys implemented in areas in close proximity, such as the interface of the Kafue Basin Ecosystem (KBE) or the wildlife–livestock interface of protected areas in proximity (e.g. Hwange National Park), have also been included.
- an identification of the highlights and main knowledge gaps in the three CCs on the basis of the available published information.

The following section provides an overview of current knowledge on the circulation of pathogens at the WLHI and the surveillance systems in place. It will also suggest some recommendations to establish monitoring surveillance strategies in order to develop baseline reference data on the circulation of selected zoonotic or production-limiting diseases in the areas

of the SWM Programme in KaZa. The ultimate goal of this section is to develop surveillance systems to monitor the circulation of pathogens from wildlife affecting human and animal health, in order to detect potential emerging pathogens that can affect the health of local communities and domestic animal populations on which they depend for their livelihoods.

B.1. Available knowledge on pathogen circulation at the WLHI

Management of diseases (including zoonoses that are transmissible between animals, mostly wildlife, and people) in the KaZa area are a concern for public health, economic and conservation reasons. CIRAD, through its research partners in Zimbabwe and the region, has been studying the circulation of several infectious diseases such as anthrax, FMD, tick-borne diseases (TBD) and BTB at the WLHI in the KaZa-TFCA for more than 20 years, and has produced an enormous amount of information on this topic. These studies provide instrumental background knowledge for the identification of animal health and disease risk challenges in order to design future pathogen monitoring activities and associated mitigation measures.

B.1.1. Available information on pathogen circulation

The site area of the SWM Programme in KaZa is characterized by a mosaic of wildlife conservation areas and rural communities living from livestock production, which generates multiple situations of cohabitation of humans, livestock and wildlife. As a result, the area is susceptible to host a wide range of emerging and re-emerging zoonotic diseases that have posed complex conservation, agroecological, anthropological, socioeconomic as well as public health challenges. Some of these diseases have been identified because they are easily detectable due to high mortalities or specific clinical signs in rural communities or their livestock. For instance, anthrax outbreaks occur regularly and almost annually during peak dry seasons, extending into the rainy season in the outskirts of the site of the SWM Programme in KaZa, causing repeated epidemics in cattle, wildlife and humans with serious ecoanthropological footprints. Rabies viruses maintained by wild carnivores such as banded mongoose (*Mungos mungo*), African wild dog (*Lycaon pictus*), spotted hyena (*Crocuta crocuta*) or several jackals (*Canis adustus, C. mesomelas*) often interact with non-vaccinated domestic dogs. As a result, human cases of rabies in that region are common and on the increase, especially in children. BTB is another endemic and classic zoonotic disease that has persisted in the Kafue ecosystem (Tembo *et al.*, 2020). The disease has since spilt over to humans from wildlife and livestock. In addition, some transboundary animal diseases with high impact on livestock health and productivity, such as FMD, African swine fever, BTB or avian influenza are of concern in the transboundary area of KaZa (Jori *et al*., 2013; Brito *et al.*, 2016).

B.1.2. Diagnostic capacity

The University of Zambia (UNZA), through the School of Veterinary Medicine, is well equipped to diagnose novel, emerging, re-emerging and zoonotic diseases using modern molecular sequencing methods. This laboratory has recently been involved in the diagnosis and nationwide surveillance of COVID-19, Ebola virus, anthrax and bubonic plague. The availability of multi-pathogen molecular sequencing is an important asset on the Zambian side regarding the capacity of diagnostic methods for wildlife species.

Despite limited diagnostic capacity in Zimbabwe, the Victoria Falls Wildlife Trust laboratory is

currently operating in the site area of the SWM Programme in KaZa and monitoring wildlife cases in close collaboration with the Central Veterinary Laboratory in Harare. Other diagnostic and surveillance platforms by a consortium of scientific cooperation partnerships initiated by CIRAD in Zimbabwe and the region are collaborating with the National Veterinary Services (including the Victoria Falls Wildlife Trust laboratory) and UNZA at the School of Veterinary Medicine. Additionally, CIRAD through its RP-PCP programme is facilitating the development of a biomolecular diagnostic platform to strengthen the molecular diagnostic capacity at veterinary faculties in both Zambia and Zimbabwe for wildlife diseases.

B.2. Identified gaps and lessons learned

B.2.1. Identified gaps

The following gaps were identified:

- Despite an important amount of research being conducted on disease over the years through international partnerships, there is no information on this topic referring to the three CCs of the SWM Programme in KaZa.
- In addition, the situation in the three CCs is likely to change due to increasing human and livestock population growth or plans to boost wild ungulate numbers for management purposes. Therefore, it requires the establishment of a local and specific disease information collection system to monitor those future changes.
- Surveillance data collected in other parts of the KaZa-TFCA is based mostly on short-term studies and biased towards pathogens affecting domestic animals or humans (See BTB, TBD or FMD). However, this is only the tip of the iceberg from a large panel of diseases that can circulate at the WLHI (Magwedere *et al.*, 2012), affecting wildlife or livestock production and human health.
- Specific wildlife disease surveys are extremely rare, mainly due to the high financial costs of large-scale wildlife capture operations and the challenges of collecting and conserving biological material in remote areas.
- Additionally, available traditional disease diagnostic methods have been, to date, pathogen-specific and required invasive techniques to extract the appropriate biological sample to detect a single specific pathogen or its related antibodies.
- The reporting and data collection system is largely paper-based and often takes several days to reach decision-makers and to send a team to the field for an outbreak investigation. This implies a slow response capacity to potential emerging zoonotic disease outbreaks.
- Official links and information channels among livestock veterinary services, wildlife management units and public health services in the field for the management of disease outbreaks such as rabies, anthrax or BTB are almost non-existent.

B.2.2. Lessons learned and opportunities for improvement

There is a tradition in the area of community-based management activities. Local communities are the first to detect disease events in free-ranging grazing areas. In addition, basic livestock support infrastructures (sale pens, dip tanks) will be developed in the three CCs where associations will be organized around livestock dipping activities. Those communities can play a role in reporting health events in free-ranging animal populations and in control activities such as vaccination of domestic animals.

The presence of the RP-PCP with an ongoing collaboration between veterinary faculties in Zambia and Zimbabwe provides the SWM Programme sites in KaZa with well-equipped laboratories and excellent capacities based on modern molecular technologies such as metagenomics. This allows the possibility of monitoring the presence of multiple pathogens out of one single animal or environmental sample but also to inform on the potential transmission dynamics of pathogens between individuals and locations (Gardy and Loman, 2018).

Mobile phone reporting systems are efficient and applicable methods of animal health surveillance and early warning systems even in remote and resource-limited settings (Robertson *et al*., 2010). Considering that this kind of approach is being developed within the three CCs for reporting HWC, the application of the same technology to disease monitoring could tremendously reduce the time for information transmission, decision-making and response capacity in the field.

Hunting camps and safari activities currently present, or planned, in the three CCs, offer the possibility of having access to regular wildlife samples. If some safari rangers or hunting camp staff are trained properly, they could provide a good source of biological material for pathogen monitoring at very low cost.

Nowadays, biological samples for pathogen monitoring can easily be collected through the use of Flinders Technology Associates (FTA) cards or filter papers. This method can be implemented in the field with very limited training and the collected material can easily be preserved at room temperature for several days. This procedure facilitates the collection and preservation of biological samples in the field in order to monitor pathogen circulation in a host population of animals or humans.

B.3. Way forward

The promotion of sustainable wildlife management activities in the SWM Programme site in KaZa requires an effective strategy to address the possible health risks induced by the expected increased interactions between humans and wild and domestic animal populations. This strategy needs to be "community centred" as well as based on a "multisectoral One Health" approach that considers wildlife, livestock, environmental and public health. The overarching objectives of this approach should include, but not be limited to, the following:

- Develop a strategy to detect, prevent and respond to outbreaks of emerging zoonotic and production limiting diseases at the WLHI.
- Enhance the participation of local stakeholders in the reporting and monitoring of health events affecting animals (domestic and wild) or communities.
- Organize training courses to facilitate the adoption and utilization of data monitoring and collection tools across the multidisciplinary surveillance network, community level inclusive.
- Promote the development of a multidisciplinary "One Health" network of communication including research partners, environmental sector, national animal health and public health facilities as well as the local communities of stakeholders.

B.3.1. Development of an innovative surveillance system to monitor wildlife and domestic borne disease risk at the WLHI

It is recommended that a modern and efficient surveillance system for wildlife and domestic borne disease risks be developed by combining genomic diagnostics and epidemiology with innovative real-time digital disease detection and reporting tools. This system will be supported by a multisectoral team of experts from different fields in the "One Health" sphere as key technical advisors in the implementation of the programme.

B.3.1.1. In wildlife

Some of the wildlife extractive activities planned in the three CCs (see sport hunting, Chapter V) can provide the basis to launch wildlife health surveys on exploited wildlife populations. Considering the financial and logistic challenges to sampling wildlife species, this approach can allow the sampling of wildlife populations at a reduced cost.

- Biological material such as blood, serum, tissues and organs can be collected from:
    - Animals culled by problem animal control (PAC) patrols, such as big herbivores (elephants, buffaloes), primates (chacma baboon, vervet monkey), carnivores (hyena, lion, leopard, civet cats), hippos and crocodiles.
    - Hunting activities implemented in hunting camps, for instance in Chete Safari area, can allow the collection of biological samples (blood, sera, tissues, swabs and FTA cards) from wildlife species hunted as trophies, such as ungulates (buffalo, bushbuck (*Tragelaphus scriptus*), impala (*Aepyceros melampus*), bushpig, greater kudu (*Tragelaphus strepsiceros*), duiker, warthog (*Phacochoerus africanus*), giraffe (*Giraffa angolensis*), plains zebra (*Equus quagga burchellii*) or to a lesser extent carnivores (lion, leopard, hyena) or some bird species.
- Blood samples can be opportunistically collected from wild animals immobilized or captured for the purpose of clinical interventions, ecological studies or translocations of game between areas. For instance, the SWM Programme in KaZa is considering the reintroduction of some plains game to boost wildlife populations in some areas of the programme. It will be necessary to sample those individuals before releasing them to make sure they are not carrying pathogens that could affect livestock and public health.

The goal is to select sample collection protocols that optimize the isolation of targeted and non-targeted pathogens. The analysis will explore a variety of sampling methods (e.g. different FTA cards and swabs) and will use different sample types (e.g. tissue samples, swabs from different body sites, FTA cards with blood or saliva) that will be tested with different metagenomics diagnostic tools to identify the most optimal performances.

Whenever possible, innovative non-invasive techniques to collect wildlife samples can be deployed in game management areas to collect saliva, faeces, water, soil and other samples for pathogen detection (Khomenko *et al.*, 2013). For some diseases, the surveillance system can be made more efficient if part of the sample preparation and processing can be decentralized to provincial laboratories in the KaZa-TFCA region.

B.3.1.2. In domestic animals

The surveillance strategy in domestic animals can be based on passive surveillance if some veterinary surveys are implemented for national animal disease surveillance programmes. In addition, some active surveillance surveys of certain zoonotic diseases particularly relevant from the public health perspective can be organized in order to have an overview of animal-borne diseases. Where necessary, comprehensive and sustained parallel-surveillance systems of wildlife can be implemented in livestock species adjacent to protected areas that share common pool resources such as water and grazing land. These will be indicative of any possible active disease transmission within that ecosystem and will be key in acting as early warning systems.

In this respect, animals reared at the wildlife–livestock interface provide the best target group for assessing spillover of infections which could potentially reach humans. Veterinary surveys in populations exposed to wildlife (sentinel populations), including ruminant species but also domestic dogs, can provide a good indication of what might be circulating in wildlife species, at a lower cost. Similarly, surveillance campaigns should be targeting those areas and periods with higher risk for certain disease events. The dry season, for instance, is prone to an increase in interactions between domestic and wild ruminants at water points.

B.3.2. Involvement of key stakeholders and local communities in an integrated disease surveillance system

Some stakeholder categories are privileged observers of events related to wildlife populations or wildlife–livestock interactions (game wardens, hunters, animal control patrols, traditional herdsmen). The development of awareness campaigns and involvement of these key informants is instrumental to identify disease problems at an early stage and respond quickly to a disease event. They could then serve as focal points in their community for the exchange of information with the official human and animal health services. Similar key informants could be identified and trained in hunting camps, for instance to report abnormal events and collect samples in case specific disease surveys are organized in wildlife populations.

Training of selected key informants will be organized within the communities to engage their participation in disease surveillance and reporting of abnormal disease events. This is particularly relevant for early detection of outbreaks of epidemic zoonosis such as anthrax, rabies, Rift Valley fever, Animal or Human Trypanosomiasis or Crimean-Congo haemorrhagic fever, for instance.

B.3.3. Provision of a strategy of data collection, storage and information flow related to animal health, disease management and diagnostic sampling and testing

At local level, the project will contribute to identifying persons acting as focal points and to building capacity within different structures to be involved in the opportunistic sampling and data collection processes at the level of hunting camps, village/community level, PAC patrols and local representatives of the veterinary services. Equally, the project will work to strengthen the capacity of local health structures in order to facilitate their contribution in the process of data collection, sample transmission, reporting and communicating health information. Short training workshops will be organized in the fields of biological samples collection (FTA cards, tissues, blood) and data collection through the use of smartphones or tablets. These will be accompanied by the organization of capacity building workshops to facilitate monitoring and collection of samples and health information, the development of national epidemiological networks and the application of epidemiological tools for better detection and monitoring of diseases.

The presence of public health risks in wildlife suggests a need to collate data to build up an integrated veterinary and public health database that allows for the timely exchange of information with the public health, veterinary and wildlife authorities. Such a system will allow for rapid and coordinated response, should some emerging health threats be detected. This is timely given that most of these zoonotic diseases are neglected and there are no control programmes in place for their surveillance and reporting.

To a greater degree, field data collection and flow should prioritize real-time mobile phone animal and human health data collection systems which offer significant benefits in terms of timeliness of disease reporting and improved data integrity. This method based on the use of open-source software KoBoToolbox (KoBoToolbox, 2020) is already being used in the collection of HWC incidents and should be prioritized. This field data collection system will allow the storage of health information in real time in a centralized database available to different partners of the project in order to improve detection, response and control of zoonotic pathogens.

B.3.4. Support of implementation of risk mitigation strategies among animal populations and exposed stakeholders

In the long term, based on the results obtained from the surveillance system, the project will establish a risk control and mitigation strategy in collaboration with the veterinary services in the area. These can include the following aspects.

B.3.4.1. Awareness campaigns on preventive measures against potential zoonotic risks

The stakeholders most exposed to domestic and wild animal contact (herders, game harvesting teams, wildlife management patrols) will receive training on preventive hygiene practices and follow awareness campaigns against major zoonotic pathogens circulating in the area, so that they can contribute to the detection of abnormal morbidity and mortality events in wildlife populations.

Similarly, local human health officials at ward level will be trained on the management of zoonotic disease outbreak response.

B.3.4.2. Support to vaccination campaigns of exposed communities and domestic animals

The project can prevent the occurrence of some recurrent outbreaks of wildlife-borne diseases in domestic animals (such as rabies, anthrax, FMD, avian influenza), by facilitating vaccination campaigns of domestic animals. This can be done through the participation in vaccination awareness campaigns among rural communities, the facilitation of cold rooms for vaccine storage, or by engaging the dip tank livestock associations in the vaccination campaigns.

C. Recommendations to pool resources in order to jointly address HWC and One Health challenges

Both HWC and health challenges at the WLHI negatively impact the human population's standard of living and conservation effort as described in the global theory of change (See Chapter III). Attempts to mitigate HWC or disease outbreaks require the involvement of individuals or directly concerned CBOs. To achieve this, the project team suggests the implementation of a pilot surveillance system based on collection of field samples from wildlife and livestock and the mobilization of community members selected by CBOs and trained by the official authorities (health and wildlife sectors). Those NR monitors will operate in the front line of any HWC or disease event by helping to source, in a timely manner, the information and samples that decision-makers need.

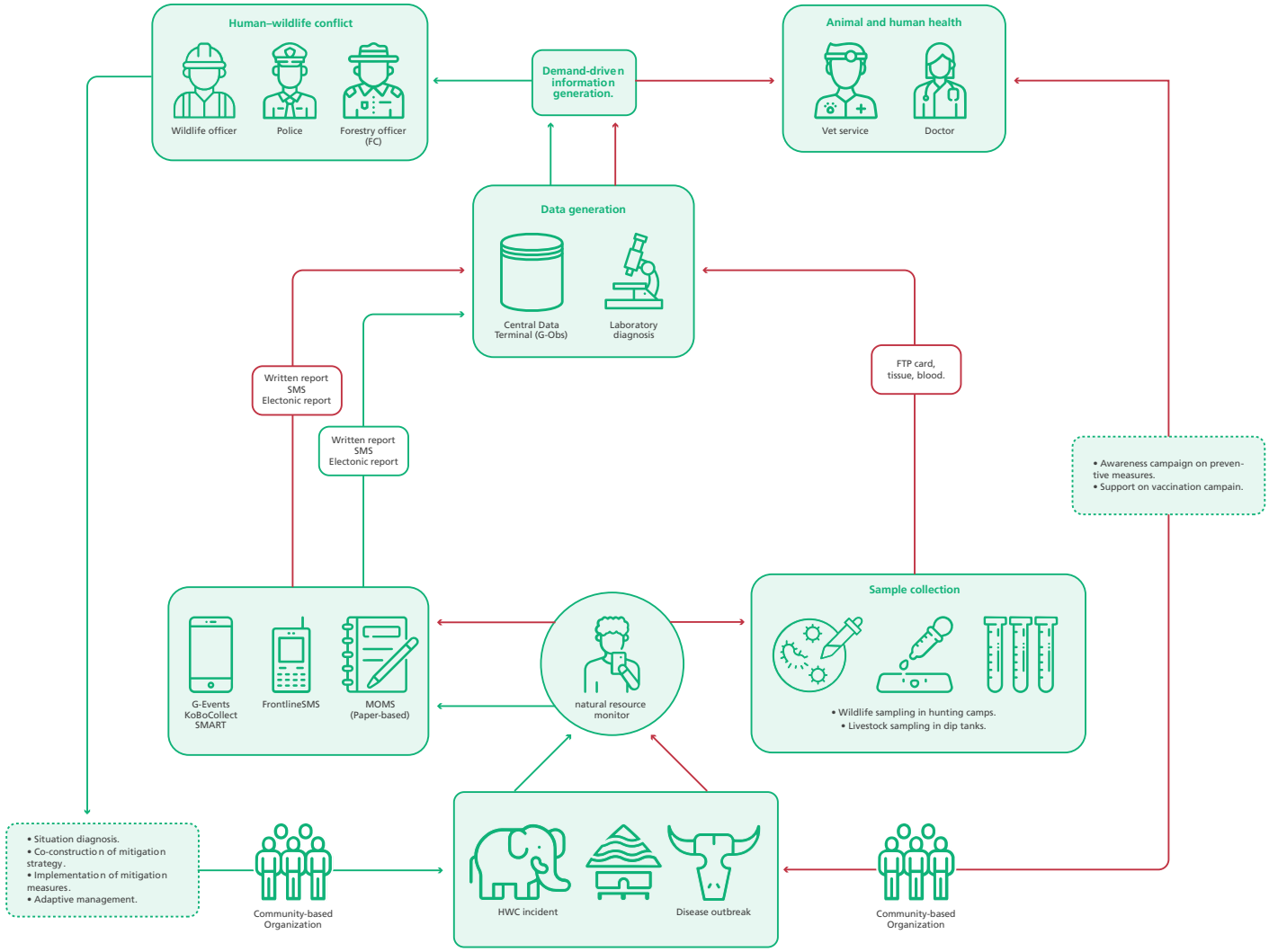
Figure IX.9 explains how both surveillance systems can operate by mobilizing the same human resource, the same tool to facilitate the flow of information, and the same information system to produce information services in order to guide practitioners on the best measures to apply. Table IX.2 below shows how the surveillance system will work step by step.

- Step 1: Incidents occur and are acknowledged by the concerned community members.
- Step 2: Trained NRMs alert the concerned authorities.
- Step 3: Data areuploaded and stored in the database; in parallel, sampling exercise is conducted for disease investigation.
- Step 4: Information is generated and displayed to the respective decision-makers.
- Step 5: Action is taken on the ground.

Table IX.2: Step-by-step process for the combined surveillance system (*Source:* Authors)

	Human–wildlife conflict	Disease outbreak
1	HWC incident occurs and the NRM is informed.	Wildlife/livestock mortalities or disease are reported to NRM by CBOs.
2	NRM reports the HWC incident using SMS or WhatsApp and records it using G-Events/KoBoCollect/MOMS.	NRM reports the event to health authorities using SMS or WhatsApp and records it using G-Events/KoBoCollect/ MOMS.
3	SMS/Report is received and saved in the database.	Local health authorities or NRM take samples and send them to the laboratory. SMS/Report is received and saved in the database.
4	Central database then automatically generates information as requested by the respective clients.	Outbreak is confirmed by the laboratory. Confirmation report is sent and saved in the database.
5	Regulatory authorities work in collaboration with CBOs to develop HWC mitigation strategies and implement relevant measures.	Awareness campaign and adequate outbreak response is organized with health authorities to prevent spread and protect stakeholders.

Figure IX.9: Suggested combined community-based surveillance system for HWC & diseases outbreaks (*Source:* Authors)



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X. GENERAL CONCLUSION AND RECOMMENDATIONS

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With the collaboration of authors of the previous chapters

Introduction

This chapter presents general conclusions and recommendations of the midterm Sustainable Wildlife Management (SWM) Programme in KaZa. These are based on the programme's theory of change developed in 2019 for each result area (R1 to R4). The chapter presents the main lessons learned during the programme's diagnostic stage and then proposes and justifies adjustments to the strategy for the remaining two and a half years of implementation.

A. General objective and initial theory of change of the SWM Programme in KaZa

The overall objective of the SWM Programme is to reconcile the challenges of wildlife conservation with those of food security in a set of key socioecosystems (forest, wetland and savannah), promoting sustainable and legal exploitation of resilient animal populations by Indigenous rural populations, while increasing/diversifying the protein supply for the benefit of rural and urban populations. The SWM Programme in KaZa, implemented in Zambia and Zimbabwe, has the model of community conservancy (CC) as a basis for a nested wild and domestic protein supply model being promoted for protein and income. This land use option is underpinned by a willingness of communities, their leaderships and partners including government to manage wildlife and other natural resources under each community's jurisdiction. In the long run, communities are expected to obtain extra and direct financial benefits from activities associated with consumptive and non-consumptive tourism.

The establishment and development of a CC is a dynamic process with feedback loops as it is displayed in the graph of the overall theory of change presented in Chapter II (Figure II.4). Development of a vision of the future of land use with respect to wildlife and other natural resources incorporates views of the community members on cohabitation with wildlife. This is proposed to be a step-by-step process of laying a basis for revising the strategy of the SWM Programme in KaZa, based on the diagnosis of the first three years.

Following is the stepwise process for a CC's adoption (Figure X.1):

i) The first step looks at the foundation process of the CC, which is the cornerstone of such an innovative land use option (Section B). The bulk of activities are related to Result R1.
ii) The next section will focus on the threats, which are negatively affecting wildlife conservation and human well-being. These threats need to be overcome to secure the buy-in of the concerned communities (Section C). Most of the activities are conducted under Result R2.

iii) With respect to the management and sharing of benefits from locally available natural resources, attention will be given in a third step to encouraging a combined and sustainable use of natural and domestic resources (Section D). Activities related to Results R2 and R3 will contribute to such an outcome, while R4-based activities will measure the levels of dependence on wild meat.

iv) For robustness of the model, the last section, related to Result R5, will scrutinize the monitoring system and capacity for adaptive management (Section E).

B. Conclusions and recommendations regarding the development of CCs' institutional framework (R1)

B.1. General objective and initial theory of change

Building a CC is a social process based on the expectations of communities for an improvement in their living conditions in a defined landscape. As expressed in Box II.1, three of the seven principles guiding the establishment of a CC focus on the institutional set-up and recognition of such governance systems:

- a legally registered entity with clearly defined boundaries;
- an entity managed by a group elected to serve the interests of all its members; and
- a land zoned for multiple uses to minimize conflict and maximize the interests of all stakeholders.

Two main outcomes were identified as key steps by the theory of change process (Figure X.2), that is, to create a strong base of an inclusive arrangement for each proposed CC:

- The first expected result is an improved institutional and legal framework enabling the establishment of a CC. Such an outcome includes that: (i) legal texts related to wildlife management are available and accessible to stakeholders; (ii) the legal frameworks as well as their strengths and weaknesses are known by stakeholders at national and local levels; (iii) all stakeholders are aware of wildlife management issues and of the associated community rights, identify priority issues and agree on management options; and (iv) participatory and inclusive processes to review normative frameworks and to improve their implementation and enforcement are carried out.
- The second associated result is that the CC is established as a formal, tangible and functional entity. Such an outcome requires the foundations of the CC, meaning preliminary establishment of the CC with an agreed land use plan proposed and adopted under a community ratified management body. This result implies that there are collaborative mechanisms between the CC and its neighbouring entities.

To achieve these specific results, three strategies are supposed to be implemented in a combined manner: (i) improvement of the institutional set-up and collaboration; (ii) search for community engagement in CCs; and (iii) implementation of good practices, development of management plan and fostering of collaboration with neighbouring parties.

Figure X.1: A proposed stepwise process to revise the site strategy of the SWM Programme in KaZa: (I) foundation process of the CC; (II) overcoming threats; (III) combining uses of natural and domestic resources; (IV) adaptive management (*Source:* Authors)

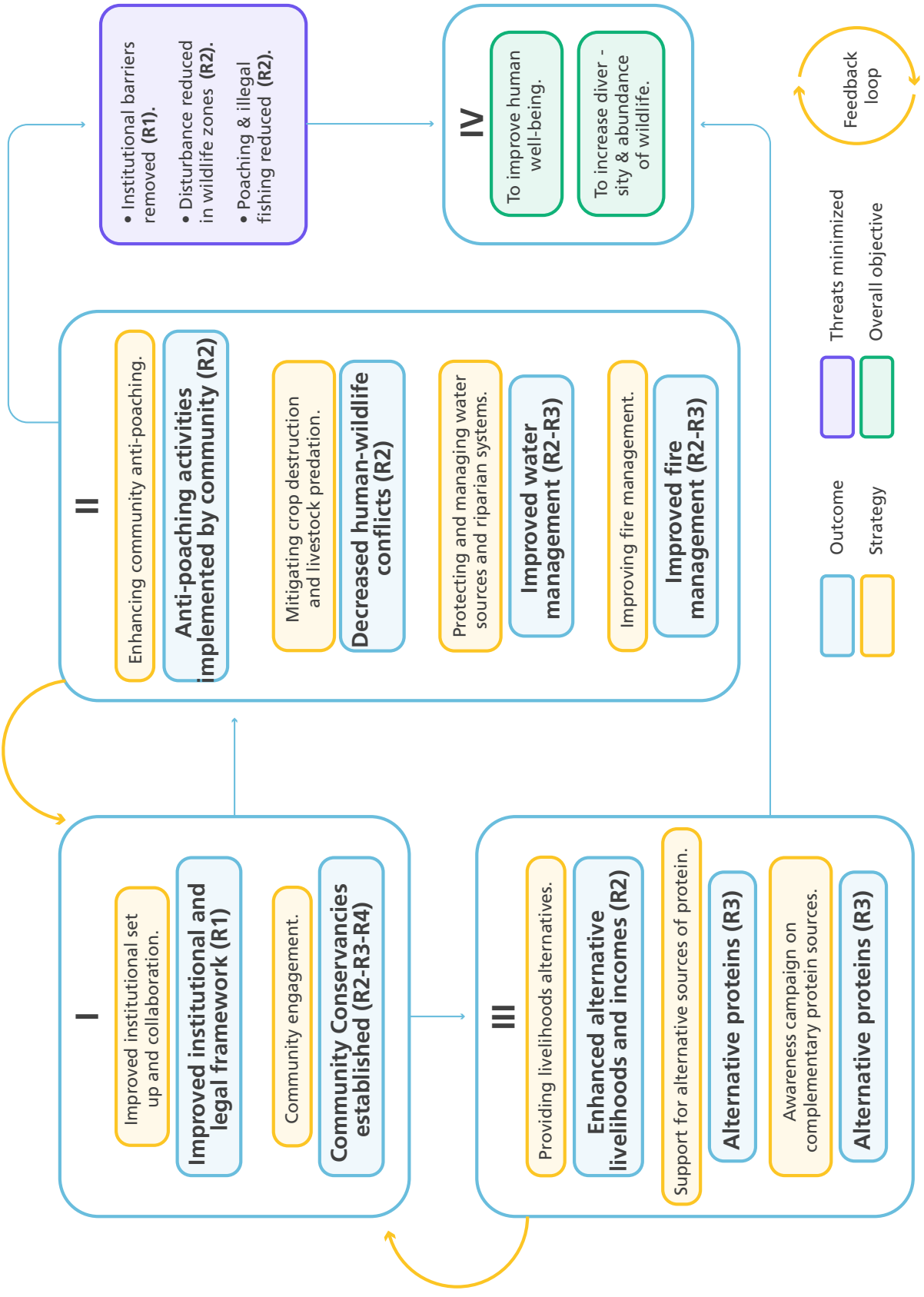
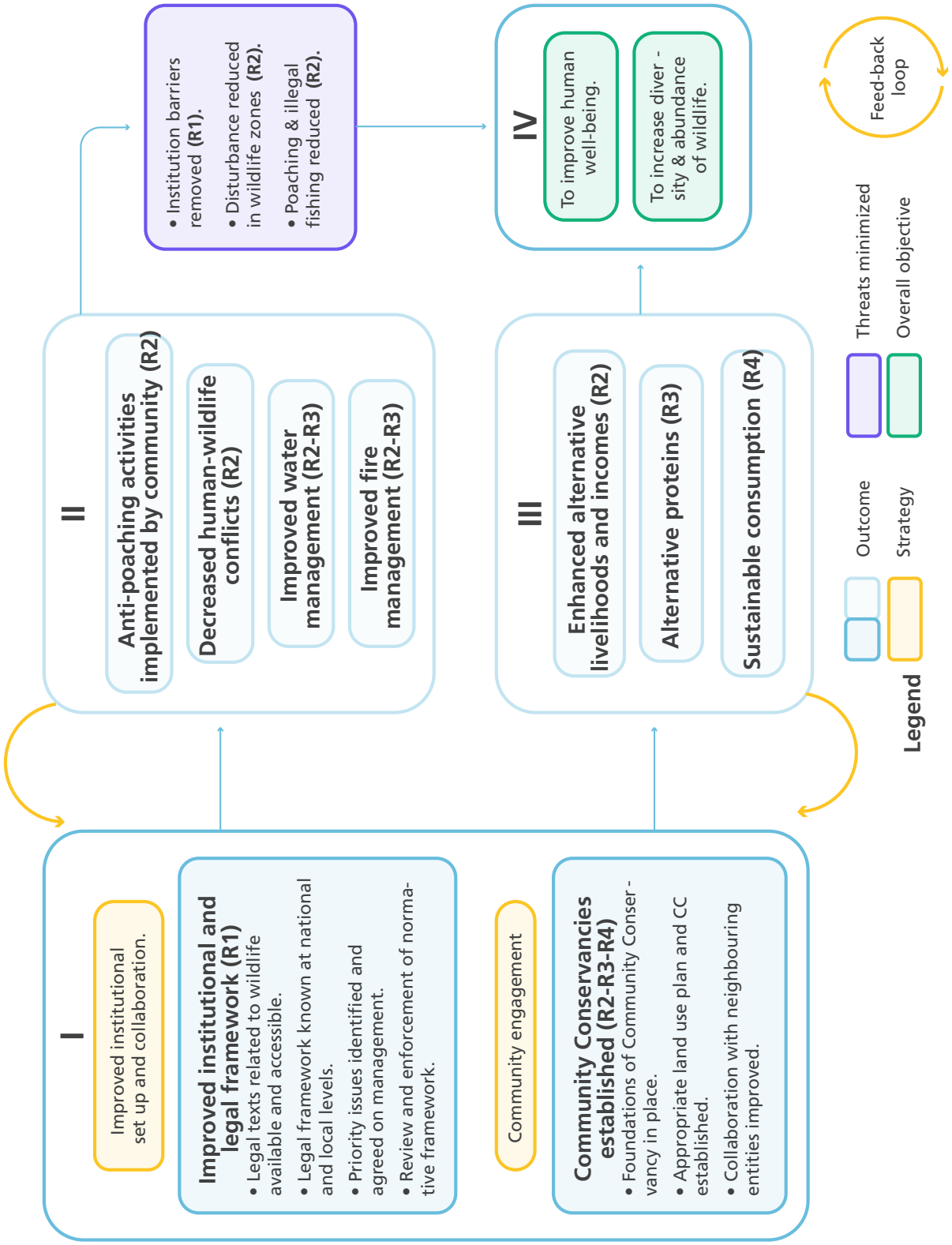

I
Improved institutional set up and collaboration.
Improved institutional and legal framework (R1)
Community engagement.
Community Conservancies established (R2-R3-R4)
II
Enhancing community anti-poaching.
Anti-poaching activities implemented by community (R2)
Mitigating crop destruction and livestock predation.
Decreased human-wildlife conflicts (R2)
Protecting and managing water sources and riparian systems.
Improved water management (R2-R3)
Improving fire management.
Improved fire management (R2-R3)
III
Providing livelihoods alternatives.
Enhanced alternative livelihoods and incomes (R2)
Support for alternative sources of protein.
Alternative proteins (R3)
Awareness campaign on complementary protein sources.
Alternative proteins (R3)
IV
To improve human well-being.
To increase diver - sity & abundance of wildlife.
• Institutional barriers removed (R1).
• Disturbance reduced in wildlife zones (R2).
• Poaching & illegal fishing reduced (R2).
Feedback loop
Threats minimized
Overall objective
Outcome
Strategy

Figure X.2: The foundation process of the CC (*Source:* Authors)


I
Improved institutional set up and collaboration.
Improved institutional and legal framework (R1)
• Legal texts related to wildlife available and accessible.
• Legal framework known at national and local levels.
• Priority issues identified and agreed on management.
• Review and enforcement of normative framework.
Community engagement
Community Conservancies established (R2-R3-R4)
• Foundations of Community Conservancy in place.
• Appropriate land use plan and CC established.
• Collaboration with neighbouring entities improved.
II
Anti-poaching activities implemented by community (R2)
Decreased human-wildlife conflicts (R2)
Improved water management (R2-R3)
Improved fire management (R2-R3)
III
Enhanced alternative livelihoods and incomes (R2)
Alternative proteins (R3)
Sustainable consumption (R4)
• Institution barriers removed (R1).
• Disturbance reduced in wildlife zones (R2).
• Poaching & illegal fishing reduced (R2).
IV
To improve human well-being.
To increase diversity & abundance of wildlife.
Feed-back loop
Threats minimized
Overall objective
Outcome
Strategy
Legend

B.2. Main conclusions

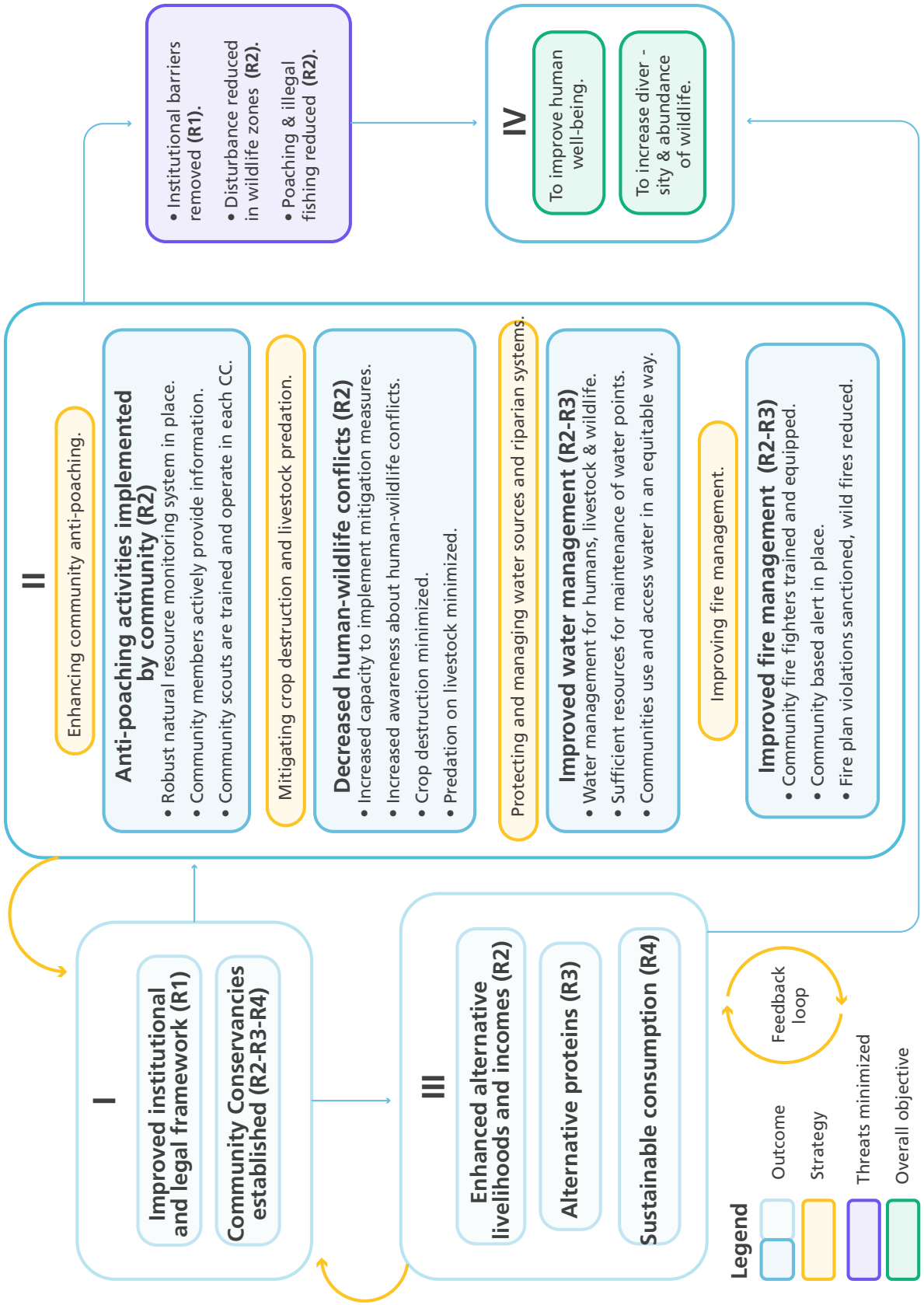
The legal establishment of a CC implies a constituted management body run by the community for promoting local development and sustainable use of wildlife and tourism. There are many dynamics that come into play in trying to promote the CC concept. For instance, there are divergent views and opinions from traditional and political leaders, as well as from the communities, that need to be considered and reconciled. This situation has required significant allocation of time from project staff in community engagements with traditional chiefs and political leadership in Simalaha Community Conservancy (SCC)/Inyasemu Community Conservancy (ICC) in Zambia and Mucheni Community Conservancy (MCC) in Zimbabwe. This is intended to bring all stakeholders (including project staff) to a common understanding of how to move forward regarding implementation of the CC concept. All of this was done by employing tools contained in the project's Free, Prior and Informed Consent (FPIC) approach to community engagement, which advocates for respecting the rights of communities to make decisions concerning exploitation and use of their natural resources, as enshrined in the United Nations Charter on Human Rights. Moreover, in this regard, an SoS officer was hired whose main responsibility is to work closely with the project staff to ensure compliance with FPIC principles, with community rights-based approach (CRBA), and develop local-level Grievance Redress Mechanisms (GRMs). The results of these engagement processes have improved confidence in the project and have helped foster a better understanding of the CC concept by communities. This is evidenced by notable improvement in the participation of chiefs in both countries at meetings to resolve issues and the active involvement of communities in all activities of the project, including participatory land-use planning (LUP) and interventions related to provision of infrastructure.

In both countries, the law was analysed through a legal matrix, from which the gaps and impediments to the promotion of a CC model were identified. Due to the differences in legal frameworks operational in Zambia and Zimbabwe, the study was conducted by hiring one national legal consultant (NLC) for each country, following the steps defined in the workplan: (i) identification and collation of the relevant texts of laws and regulations (pertinent to each CC) and the policy documents; (ii) survey on law implementation at national and community level; and (iii) development of a legal consistency document and a legal gap analysis.

This work is still in process in Zambia, but has been completed in Zimbabwe. A workshop held on behalf of the Ministry of Environment at the Zimbabwean level allowed the NLC and the SWM Programme team to share results with the other ministries and the private sector in the country in order to consolidate the different outputs gathered during the first two years of the project. This led to the drafting of a legal country profile (LCP), which details the different normative systems governing the country (land and inland water; sustainable wildlife management; animal production; and the distribution of wildlife/agriculture/livestock products and their safety) and analyses the implementation of international and regional tools. This LCP reports that one common thread is that some of the Acts of Parliament, especially the ones related to wildlife, have not been aligned to the Zimbabwean Constitution, and the following are the major recommendations aligned to law reform on sustainable wildlife management:

- Review the Wildlife Policy.
- Amend the Parks and Wildlife Management Act so that the principle of sustainable development is clearly articulated and strengthened.
- Enact regulations to support implementation of Communal Areas Management

Figure X.3: Overcoming threats of the CC (*Source:* Authors)


I
Improved institutional and legal framework (R1)
Community Conservancies established (R2-R3-R4)
II
Enhancing community anti-poaching.
Anti-poaching activities implemented by community (R2)
• Robust natural resource monitoring system in place.
• Community members actively provide information.
• Community scouts are trained and operate in each CC.
Mitigating crop destruction and livestock predation.
Decreased human-wildlife conflicts (R2)
• Increased capacity to implement mitigation measures.
• Increased awareness about human-wildlife conflicts.
• Crop destruction minimized.
• Predation on livestock minimized.
Protecting and managing water sources and riparian systems.
Improved water management (R2-R3)
• Water management for humans, livestock & wildlife.
• Sufficient resources for maintenance of water points.
• Communities use and access water in an equitable way.
Improving fire management.
Improved fire management (R2-R3)
• Community fire fighters trained and equipped.
• Community based alert in place.
• Fire plan violations sanctioned, wild fires reduced.
III
Enhanced alternative livelihoods and incomes (R2)
Alternative proteins (R3)
Sustainable consumption (R4)
• Institutional barriers removed (R1).
• Disturbance reduced in wildlife zones (R2).
• Poaching & illegal fishing reduced (R2).
IV
To improve human well-being.
To increase diver - sity & abundance of wildlife.
Legend
Outcome
Strategy
Threats minimized
Overall objective
Feedback loop

Programme for Indigenous Resources (CAMPFIRE) and Community-Based Natural Resources Management (CBNRM) initiatives.

- Build capacity of communities so that they are able to negotiate contracts, establish and run community trusts and develop by-laws on natural resources.
- Strengthen the participatory nature of development of By-laws on Natural Resources as provided for in terms of the Environmental Management Act and Rural District Council (RDC) Act.
- Raise awareness of environmental rights and property rights of communities so that they are able to assert them.

For Zimbabwe, the main recommendation is reviewing the Parks and Wildlife Act, whereas in Zambia the main recommendation is to review the Zambia Wildlife Act No. 14 of 2015. Moreover, both countries should also review any other ancillary regulations that may cause hurdles in the process so that the establishment and regulation of CCs is provided for in both countries. Furthermore, the law should allow for the creation of a platform in each country for the community in relation to CBNRM policy at national and regional levels, as well as within the context of transfrontier conservation areas (TFCAs).

B.3. Revision of the strategy based on the diagnoses of the first three years

As shown in Chapter IV, there is no legal position which recognizes the establishment of a CC in either of the two countries.

In Zimbabwe, MCC is an extension of the CAMPFIRE concept, and the RDC remains the appropriate authority (AA) over the conservancy. There is no legal instrument for the communities to participate in the establishment of a CC, and the institutional model to constitute a community conservancy would involve the registration of the community as a Trust, an Association or a Cooperative company. Upon registration of the CC it can enter into contracts with safari operators and other private–community partnership agreements, giving them direct control over its resources.

In Zambia, there are three routes that can be taken for the establishment of a CC:

- The first route is creating a Community Rights Board (CRB) under the Zambia Wildlife Act of 2015 which makes provision for the establishment of various protected areas, including conservancies and community protected areas.
- The second route is through a public private partnership agreement (PPPA), in which case a conservancy can be established on traditional or customary land by signing an MoU with private investors.
- The third route is through the Zambia Forest Act of 2015, by which the community can designate an area as a community conservancy by applying to the Forestry Department. However, in the case of SCC, a Community Conservancy Trust was established to enable local communities as members of the Trust to develop and manage a range of activities, improving their livelihoods and fostering sustainable use of their natural resources.

Even though significant steps have been taken in the analysis of the legal aspects, a slight delay, more so in Zambia, means that the SWM Programme in KaZa must continue to follow the same strategies as those defined from the outset in the theory of change. However, the focus must be

on the theory of change strategy: "Improved institutional set-up and collaboration" by:

- using the LCPs in each of the two countries, which have been drawn up in close contact with the government focal points, to enable policymakers to align the above recommendations for law reform on sustainable wildlife management;
- deciding with decision makers, traditional leaders, private sector and communities the legal status to be given to the CC (association, trust, etc.). This status can be different in the two countries, but for each of the CCs a Management Body should be established to manage and report on the implementation of the activities within the CC.

C. Conclusions and recommendations regarding the process of overcoming CC threats (R2, R3)

C.1. General objective and initial theory of change

At the scale of a territory with defined boundaries and a management structure run by the community, CCs are the proper entity to "minimize conflict and maximize the interests of all stakeholders" (See Box II.1). To highlight the importance of this statement, four major constraints were identified during the consultation process leading to the production of the current theory of change: poaching, human–wildlife conflicts (HWCs), water scarcity and bush fires. In response to such challenges, which are key to increasing the buy-in of the concerned communities, the following four outcomes were identified during the theory of change workshops (Figure X.3):

- Anti-poaching activities implemented by community: Based on a robust natural resource monitoring system, community members will participate in the record of information related to illegal natural resource extraction, enabling trained community scouts to intervene within the CC.
- Decreased HWCs: The challenge is to increase the local capacity of communities to implement mitigation measures in order to minimize crop destruction and the predation of livestock.
- Improved water management: To reduce water scarcity, dedicated water points will be established to cover human, livestock and wildlife needs in an equitable way. Sufficient resources will be allocated by the CCs for maintenance of water points.
- Improved fire management: Community firefighters will be trained and equipped. Based on a community-based alert system in place, fire plan violations will be sanctioned and uncontrolled fires reduced.

To achieve these specific results, four strategies are implemented in a combined manner: (i) enhancing community anti-poaching; (ii) mitigating crop destruction and livestock predation; (iii) protecting and managing water sources and riparian systems; and (iv) improving fire management.

C.2. Main conclusions

Once the CCs are formally recognized by government authorities, the development of tools for

both communities and protected area managers to monitor and assess their effectiveness to manage and protect resources will be encouraged. This will also lead to a better understanding by communities of the impact of illegal activities on their well-being.

C.2.1. Anti-poaching

Anti-poaching activities are challenging as food security is expected to decrease in the area due to the increasingly poor macroeconomic conditions, consecutive droughts and continued COVID-19 impacts. The impact of the COVID-19 crisis is systemic: it is challenging for all sectors and activities including food supply and wildlife conservation, and has highlighted the vulnerability of the communities living in remote areas on the edge of conservation zones. It also shows the key role of wild resources in local resilience to crises and the limited number of alternatives beyond reliance on food aid. This crisis confirms the importance of combining wildlife protection and local development – a challenge that the SWM Programme in KaZa aims to meet. Another observed consequence is that it has become more common for younger people to go hunting. Envisaged ways of reducing poaching, as well as improving the viability of wildlife management enterprises, are the following: (i) restocking of game, as previously done in Simalaha CC; and (ii) training of a large number of community game guards who will promote harmonious patrols with the rangers in the Parks and Forest estate.

C.2.2. Human–wildlife conflict mitigation

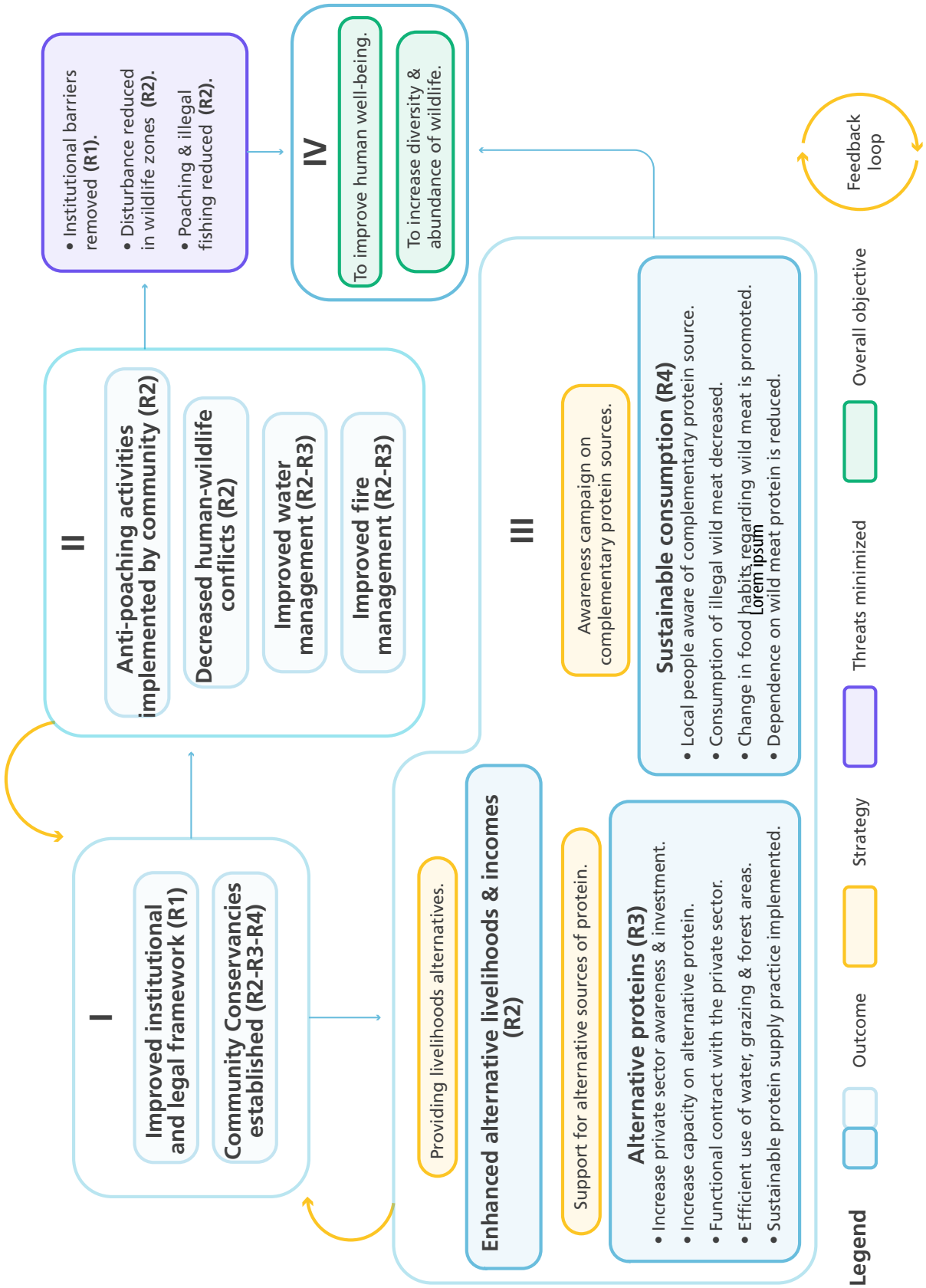
Initiatives to reduce HWC are key to the success of the conservancy project, and therefore an HWC mitigation strategy is critical in the field of conservation and management of wildlife. As the objective is not to eliminate HWCs but to reduce them to a socially tolerable level, the recommended objective is to move from a logic of conflict management to a policy of coexistence, by taking the needs and expectations of the communities into consideration. The setting up of designed HWC platforms for each CC could allow a collaborative learning process for adaptive management with ad hoc training for capacity building. In this respect, several strategies could be promoted:

- to favour the movement of wildlife by creating corridors among national parks (NPs), safari areas (SAs), game management areas (GMAs) and other protected areas, as promoted by the KaZa-TFCA in its Master Integrated Development Plan;
- to install fences to limit the movement of wildlife into human settlements as well as of domestic animals into wildlife corridors;
- to protect livestock through appropriate livestock kraals and controlled access to conservancies/NPs during periods of grazing and water shortages; and
- to increase the number of water points, and consequently decrease the possibility for wildlife to encounter humans and their domestic herds.

C.2.3. Water management

This last point of increasing the number of water points to reduce HWC was taken in charge by the SWM Programme in KaZa through the rehabilitation/provision of boreholes in the CCs and training of borehole minders to carry out repairs and maintenance. Furthermore, the process of co-developing new fish farming systems could lead to the design of profitable farming systems, and the development of this kind of new water bodies would also reduce the risk of conflicts between humans and wildlife. In terms of mitigating water-related problems, some other

Figure X.4: Combining uses of natural and domestic resources (*Source:* Authors)


I
Improved institutional and legal framework (R1)
Community Conservancies established (R2-R3-R4)
II
Anti-poaching activities implemented by community (R2)
Decreased human-wildlife conflicts (R2)
Improved water management (R2-R3)
Improved fire management (R2-R3)
• Institutional barriers removed (R1).
• Disturbance reduced in wildlife zones (R2).
• Poaching & illegal fishing reduced (R2).
IV
To improve human well-being.
To increase diversity & abundance of wildlife.
III
Providing livelihoods alternatives.
Enhanced alternative livelihoods & incomes (R2)
Support for alternative sources of protein.
Alternative proteins (R3)
• Increase private sector awareness & investment.
• Increase capacity on alternative protein.
• Functional contract with the private sector.
• Efficient use of water, grazing & forest areas.
• Sustainable protein supply practice implemented.
Awareness campaign on complementary protein sources.
Sustainable consumption (R4)
• Local people aware of complementary protein source.
• Consumption of illegal wild meat decreased.
• Change in food habits regarding wild meat is promoted.
Lorem ipsum
• Dependence on wild meat protein is reduced.
Feedback loop
Legend
Outcome
Strategy
Threats minimized
Overall objective

recommendations can be proposed to provide both humans and livestock with clean water and to enlighten the community on the principles of integrated water resource management as a basis for best practices in water resource management:

- drilling community wells for domestic water use and developing skills by providing training to some of the community members for well operation and maintenance;
- harnessing spring water in large reservoirs with a steady flow, and introducing communities to rainwater harvesting technologies (dam construction, etc.);
- instilling a sense of water stewardship within communities through the formation of river management committees and water user associations; and
- raising awareness about the causes of water resource (river) degradation.

C.2.4. Fire management

The management of fires that appear to have a major role in the theory of change has not been sufficiently studied in these first years of the SWM Programme in KaZa; nevertheless, the importance of fire lines is well known by the communities and the local authorities. They could be used for the delimitation of the CCs' boundaries and surrounding protected areas, safely maintained through a network of fire lines that should be marked, and kept clean of vegetation to facilitate patrolling.

C.3. Revision of the strategy based on the diagnoses of the first three years

Among the threats that can affect the CCs, a greater effort has been made towards resolving the threat of HWC. The creation of an HWC platform, which could be directly managed by the CCs' management committees, could help transfer a part of responsibility and monitoring from the team of the SWM Programme in KaZa to the local communities. This platform would indirectly also play a role in the enhancement of anti-poaching activities, as some tools are being implemented through training sessions and workshops on these topics (e.g. use of bomas to protect livestock, awareness-raising on Management Oriented Monitoring Systems (MOMS) to share HWC information, etc.).

D. Conclusions and recommendations regarding the opportunity of combining natural and domestic resources in CC (R2, R3, R4)

D.1. General objective and initial theory of change

The cornerstone of a good CC is one that allows its members to make a living from the sustainable use of natural resources (wildlife, fish and non-timber forest products – NTFPs) by complementing their agricultural activities. The bet is that direct financial benefits from activities associated with natural resources will increase the capacity of farmers to cope with environmental and economic hazards. This specific objective echoes the third guiding principle of CC establishment (See Box II.1) which states that a CC is "a place where residents can add income from natural resources management (wildlife, tourism) and from traditional farming activities". This important statement is completed by two other statements of Box II.1 that emphasize the value of the land, its natural resources and the services being provided.

In the 2019 theory of change, three expected outcomes were chosen to address this specific objective (Figure X.4):

- Enhanced alternative livelihoods and incomes (R2): Wildlife-based enterprises generate income.
- Alternative proteins (R3): Based on functional contracts between producers and the private sector, the capacity of local people to produce sustainable protein from fish, livestock and NTFP increases.
- Sustainable consumption (R4): Local people are aware of complementary and alternative protein sources and reduce their consumption of illegally harvested wild meat. To achieve these specific results, three strategies are implemented in a combined manner: providing livelihood alternatives; supporting alternative sources of protein; and organizing awareness campaigns on complementary protein sources.

D.2. Main conclusions

D.2.1. Wildlife-based enterprise (R2)

Well-regulated and legal trophy hunting programmes can play an important role in delivering benefits for both wildlife conservation and for the livelihoods and well-being of Indigenous and local communities living with wildlife.

As previously noted, CCs' management plans are an important guide for resource use and protection that will benefit the local communities and their posterity. Developing of a sustainable wildlife cropping programme and improving the commercial value of a broader spectrum of wildlife species will help increase economic flows into the area and diminish the income generating burden placed on limited numbers of high-value trophy species. This will depend on successful restocking and the meat being sold (as recommended by the communities) instead of being given out for free. Restocking of game that will improve viability of the wildlife management enterprises is scheduled in the second semester of the third year of the project.

There is a need to increase advertisement of these CCs and associated products in the area to increase visibility and attract primarily investors and then clients, and to solve the main challenges of accommodation and food provision for tourists. Efforts should be made for this purpose to integrate the conservancy into already existing tourist routes.

D.2.2. Non-timber forest products (R2-R3)

As CCs are adjacent to protected game areas, sustainable forest management could be fostered through activities such as beekeeping and the harvesting of NTFP products. With the trade and sale of processed natural resources, support for nature-based tourism could easily be promoted.

D.2.3. Fishing and aquaculture (R2-R3)

Fish access is dependent on the availability of water (permanent in SCC; restricted in ICC and MCC). In SCC, one way of coping with the fishing ban during a period of year (1 December – 28 February) is to adapt fish capture practices to the abundance of species that are not subject to global conservation.

In SCC, where water is not lacking, aquaculture could be promoted through an integration with other types of production systems and the development of farmers' organizations. In ICC

and MCC, the large quantity of water at the end of the rainy season could help promote a new model of fish farming in seasonal ponds.

With the development of fish processing units, fish farmers will enhance their fish production capacity and support the creation of small-scale fisheries.

D.2.4. Livestock production (R3)

Livestock developmental needs of communities are complex, in terms of both size and scope. Therefore, huge amounts of financial investments and human resources are required as well as a longer period of implementation. Although the environment is suitable for livestock production, this sector suffers from frequent disease outbreaks, a lack of marketing with limited support from the private sector, and farming infrastructure that is inadequate or in disrepair.

To make an impact within the time frame of engagement, major recommendations are made:

- creation of local community-based livestock development associations to spearhead livestock development activities with sustained attention and the implementation of safeguards to avoid elite capture;
- reinforcement of the engagement of the private sector in support of commercialization of the smallholder livestock sector and market development including market linkages and funding models;
- genetic improvement of goats and poultry, with measures aimed at meeting the requirements of these demanding animals which require adapted feed and veterinary care;
- finalization of a participatory land use plan incorporating grazing management;
- education and training to take centre stage in capacity building of farmers, especially in the field of governance, market intelligence and financial management;
- decrease in occurrence of livestock diseases through the establishment of disease control infrastructure.

All these previously developed aspects aim at contributing to increasing the availability of meat and allowing the sustainability of consumption. The challenge for the SWM Programme in KaZa is to make it accessible for a population whose purchasing power and capacity for home production is highly limited.

D.2.5. Sustainable wild meat consumption (R4)

In many cases, there are traditional reasons behind consumption of wild meat which make it complex for the SWM Programme in KaZa to reduce consumption beyond a certain level. Therefore, the focus is not to overcome those reasons, as they are culturally embedded in the communities. However, consumption of wild meat from large mammals due to inaccessibility of alternative protein sources can be greatly reduced by accomplishing the aforementioned objectives and recommendations. Hence, the aim of the programme is to reduce the consumption of wild meat from large mammals to less than 10 percent of the total food consumption of households through successful implementation of the outlined programme objectives.

In order to achieve this target, it is essential for the local communities to be made aware of the alternative protein sources available to them. Simultaneously, this awareness campaign needs to focus on decreasing the consumption of illegal wild meat among communities while emphasizing changing their food habits regarding wild meat.

D.3. Revision of the strategy based on the diagnoses of the first three years

The SWM Programme in KaZa made significant progress regarding the opportunity to combine natural and domestic resources in the three CCs, and more importantly in clarifying the collaboration among stakeholders of different commodity chains. There is strong encouragement to promote the establishment of farmers' associations, an aspect not precisely mentioned in the initial theory of change. Support for the different sources of alternative protein (livestock production, fish farming, NTFPs) will have to be enhanced by specific and dedicated strategies.

E. Conclusions and recommendations regarding the establishment of an adaptive management of the CCs

E.1. General objective and initial theory of change

As mentioned in previous chapters, the governance structure of the CC indicates that this community entity is owned and managed by its people through dedicated structures. To create an iterative process of decision-making, the production of data, information and knowledge by and for the people is required. Based on this learning process, adaptive management will enable the long-run management of the CCs and help achieve the final objective set by the SWM Programme, which is to increase diversity and abundance of natural resources and improve human well-being. By the end of 2023 the programme's ambition states five goals to reach:

1. 80 percent of the area in the targeted CCs have functional ecosystems to sustain vital populations of key wildlife species;
2. The area under forest cover in the CCs is increased by 20%;
3. 80 percent of households in the targeted CCs are at least at 150% of the poverty index (30 percent is based on natural resources sustainable agriculture production systems);
4. At least 80 percent of targeted households in the CCs have a diversified diet; and
5. 90 percent of the targeted households in the CCs have access to clean and safe drinking water.

Requesting the development of a locally based information system will meet some CC principles by monitoring the increase of wildlife populations, the increase of natural resources, and the channelling and integration of goods and services provided by the CC (Box II.1).

E.2. Main conclusions

The two ultimate goals of the SWM Programme – improved human well-being and increased diversity and abundance of NR – will be reached once the threats presented in the theroy of change are minimized, and opportunities provided by integrated and sustainable uses of natural/domestic resources are utilized. That implies that all the aspects previously developed in the present report are not only implemented but also managed by CC members in a holistic and timely manner. A self-adaptive management scheme highlights the need for a robust information system based on the principle: "*If you can measure it, you can manage it*" (Kaplan and Norton, 1996).

Chapter IX, focusing on human–wildlife interactions, proposes the creation of a locally based information system involving users in the resolution of HWC, from the data collection process to the production of dedicated information services. This HWC platform addresses and articulates at the same time the needs of the managers in charge of conservation issues and the needs of

individuals or community-based organizations (CBOs) who carry the costs of living with wildlife. This sociotechnical tool could easily be adapted to other CC issues that need to be monitored for management purposes. Figure IX.10 gives an example of how natural resource monitors could contribute at the same time to the surveillance and mitigation of HWC, and to the control of disease outbreaks affecting livestock production.

The information services that can assist CCs' members and stakeholders as defined in the previous chapters are as followed:

- CC's institutional framework, advantages and opportunities that arise within CCs;
- flow of information related to legal establishment of CCs, which must be recognized as wildlife land use entities;
- any information services for overcoming threats to CCs;
- collection of data and feedback information for the purpose of CCs' management in the control of poaching, wildfires and water management; and
- various information to help farmers and producers' associations engaged in the production of goods or services from domestic/natural resources, including:
    - employment and market opportunities;
    - engagement of the private sector through public–private–community partnership arrangements;
    - pilot livestock, aquaculture and NTFP production systems as alternative sources of proteins to wild meat; and
    - ways of involving women and youth in production associations or cooperatives.

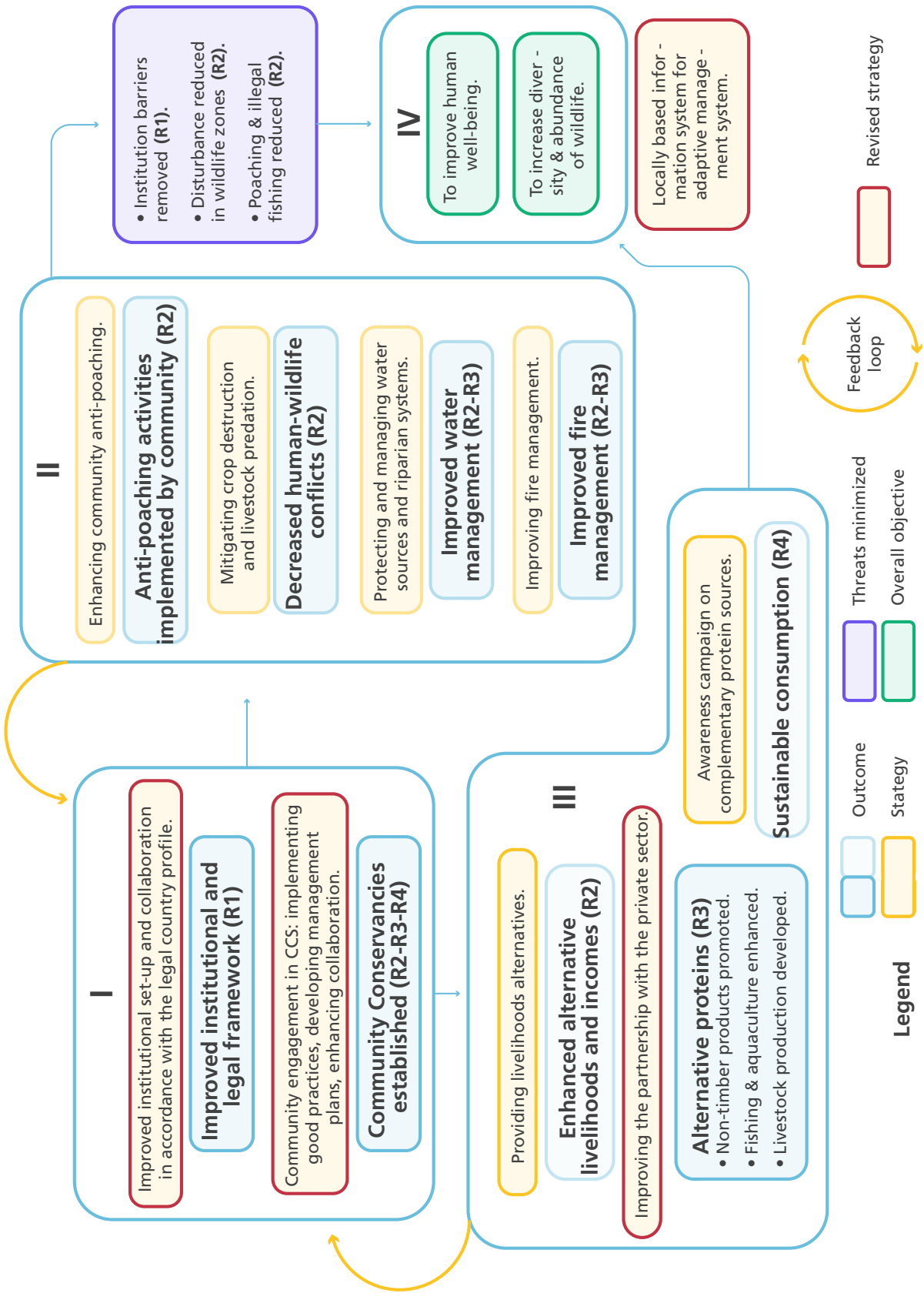
E.3. Revision of the overall project strategy based on the diagnosis of years 1 to 3

Based on these conclusions, minor modifications have been made to the theory of change (Figure X.5):

- The outcome box "Alternative proteins" was improved through a better distinction between the different sources of proteins, as the activities carried out for each of them no longer correspond to the same principles as in the first phase of the project.
- As the legal country profiles have now been almost finalized, the team added to the strategy "Improved institutional set-up and collaboration" the sentence "in accordance with the LCPs".
- The authors merged the two following strategies "Community engagement in CCs" and the box "Implementing good practices; Develop CC management plan; Enhancing collaboration" as they are all related;
- At least two new strategies were proposed to appear in the revised ToC:
    - "Improving the partnership with the private sector" at the interface between the outcome boxes;
    - "Enhance alternative livelihoods" and "Alternative proteins"; and
    - "Locally based information system for adaptive management purpose" linked with the two ultimate goals.

This amended theory of change has the advantage that the indicators that have been monitored since the beginning of the project remain the same.

Figure X.5: Revised strategy of the SWM Programme in KaZa (*Source:* Authors)
Circled in red: revised or new strategies (yellow boxes)


I
Improved institutional set-up and collaboration in accordance with the legal country profile.
Improved institutional and legal framework (R1)
Community engagement in CCS: implementing good practices, developing management plans, enhancing collaboration.
Community Conservancies established (R2-R3-R4)
II
Enhancing community anti-poaching.
Anti-poaching activities implemented by community (R2)
Mitigating crop destruction and livestock predation.
Decreased human-wildlife conflicts (R2)
Protecting and managing water sources and riparian systems.
Improved water management (R2-R3)
Improving fire management.
Improved fire management (R2-R3)
III
Providing livelihoods alternatives.
Enhanced alternative livelihoods and incomes (R2)
Improving the partnership with the private sector.
Alternative proteins (R3)
• Non-timber products promoted.
• Fishing & aquaculture enhanced.
• Livestock production developed.
Awareness campaign on complementary protein sources.
Sustainable consumption (R4)
• Institution barriers removed (R1).
• Disturbance reduced in wildlife zones (R2).
• Poaching & illegal fishing reduced (R2).
IV
To improve human well-being.
To increase diver - sity & abundance of wildlife.
Locally based infor - mation system for adaptive manage - ment system.
Feedback loop
Revised strategy
Threats minimized
Overall objective
Outcome
Stategy
Legend

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APPENDIX

List of the species to be found in the CCs of the SWM Programme in KaZa and mentioned in the report

Common (English) Name	Scientific name
Mammals and reptiles	
Aardvark	*Orycteropus afer*
African civet	*Civettictis civetta*
African wild dog	*Lycaon pictus*
Banded mongoose	*Mungos mungo*
Black-backed jackal	*Canis mesomelas*
Blue wildebeest	*Connochaetes taurinus*
Bushbuck	*Tragelaphus scriptus*
Bushpig	*Potamochoerus larvatus*
Cape buffalo	*Syncerus caffer*
Caracal	*Felis caracal*
Chacma baboon	*Papio ursinus griseipes*
Common duiker	*Sylvicapra grimmia*
Eland	*Taurotragus oryx*
Elephant	*Loxodonta africana*
Genet	*Genetta genetta*
Giraffe	*Giraffa angolensis*
Greater kudu	*Tragelaphus strepsiceros*
Hare	*Lepus microtis*
Hippopotamus	*Hippopotamus amphibius*
Impala	*Aepyceros melampus*
Klipspringer	*Oreotragus oreotragus*
Lechwe	*Kobus lechwe*
Leopard	*Panthera pardus*
Lion	*Panthera leo*
Nile crocodile	*Crocodylus niloticus*

Plains zebra	*Equus quagga burchellii*
Porcupine	*Hystrix africaeaustralis*
Puku	*Kobus vardonii*
Sable antelope	*Hippotragus niger*
Sharpe's grysbok	*Raphicerus sharpei*
Spotted hyena	*Crocuta crocuta*
Steenbok	*Raphicerus campestris*
Tortoise	*Testudinidae*
Vervet monkey	*Chlorocebus pygerythrus*
Warthog	*Phacochoerus aethiopicus*
Waterbuck	*Kobus ellipsiprymnus*
Batrachians and Fishes	
Bottle nose	*Mormyrus longirostris*
Catfish	*Clarias gariepinus*
Kapenta	*Limnothrissa miodon*
Mozambican tilapia	*Oreochromis mossambicus*
Pink bream (tilapia)	*Oreochromis niloticus, O. andersonii*
Sharptooth catfish	*Clarias gariepinus*
Tigerfish	*Hydrocynus vittatus*
Toad (African bull)	*Pyxicephalus edulis*
Birds	
Helmeted guinea fowls	*Numida meleagris*
Red-billed quelea quails	*Quelea quelea*

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